
Meridian 1

X11 Release 25

Succession Communication Server for Enterprise 1000

X21 Release 2.0

Internet Terminals Description

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Revision history

November 2002

Standard 2.00. This document is up-issued to support the Succession Communication Server for Enterprise 1000, Release 2.0.

March 2002

Standard 1.00. This document is the first issue of the Internet Terminals Description guide. This guide includes information on the i2004 Internet Telephone and the i2050 Software Phone.

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About this document

This document is a global document. Contact your system supplier or your Nortel Networks representative to verify that the hardware and software described is supported in your area.

Subject

This document describes the i2002 and i2004 Internet Telephones and the i2050 Software Phone.

Applicable systems

This document applies to a Meridian 1 large system (Option 51C, 61C, or 81C), a Meridian 1 small system (Option 11C or 11C Mini), and a Succession Communication Server for Enterprise (CSE) 1000 system. For the purposes of this document, all of these systems are referred to generically as "system."

i2002 Internet Telephone

Contents

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Reference list

The following are the references for this section:

- *IP Line: Description, Installation and Operation* (553-3001-204)
- *Software Input/Output: Administration* (553-3001-311)
- *i2002 Internet Telephone User Guide*

Overview

This section describes the i2002 Internet Telephone, and provides procedures that explain how to install and maintain the i2002 Internet Telephone.

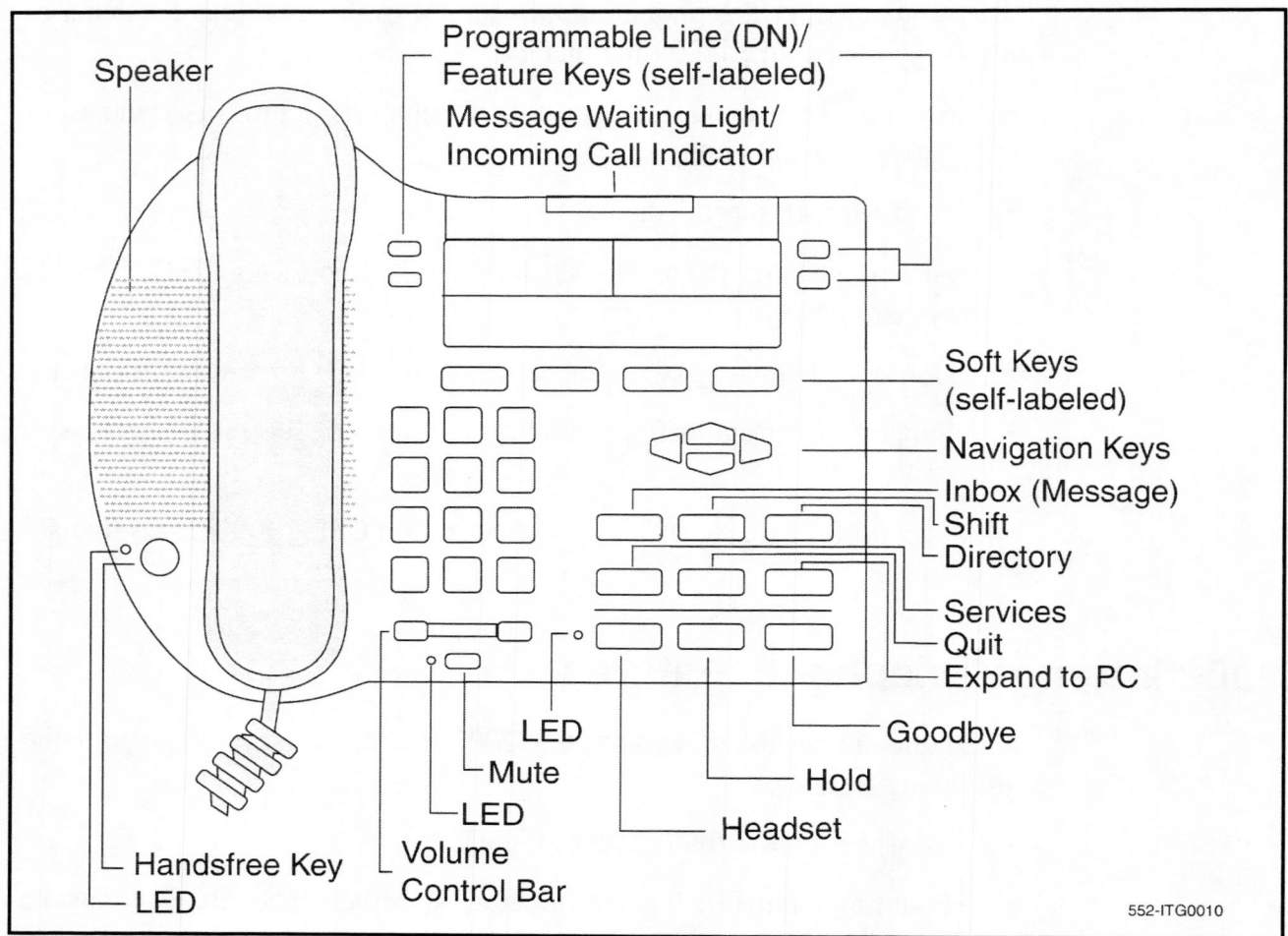
This section contains the following procedures:

- Procedure 1, “Pre-installation checklist” on page 20.
- Procedure 2, “Installing an i2002 Internet Telephone for the first time” on page 24.
- Procedure 3, “Installing an i2002 Internet Telephone for the first time using DHCP” on page 29.
- Procedure 4, “Changing the TN of an existing i2002 Internet Telephone” on page 32.
- Procedure 5, “Replacing an i2002 Internet Telephone” on page 33.
- Procedure 6, “Removing an i2002 Internet Telephone from service” on page 34.

i2002 Internet Telephone description

The i2002 Internet Telephone brings voice and data to the desktop environment and connects directly to the LAN through the Ethernet connection. Similar in appearance and functionality to the i2004 Internet Telephone, the i2002 Internet Telephone has a smaller display and fewer feature keys. See Figure 1: “i2002 Internet Telephone components” on page 13.

Figure 1
i2002 Internet Telephone components



New supported features

The i2002 Internet Telephone supports the following new features that are also supported on the i2004 Internet Telephone:

- 802.1Q VLAN and Layer 2 priority bit support, an industry standard for managing bandwidth usage.
- NAT support improvement.
- Ability to change the feature key labels (with Succession CSE 1000 R2.0 systems only).
- Corporate Directory (with Succession CSE 1000 R2.0 systems only).
- Support for Virtual office (with Succession CSE 1000 R2.0 systems only).
- Support for Branch Office (with Succession CSE 1000 R2.0 systems only).

i2002 Internet Telephone features

In addition to the above features, the i2002 Internet Telephone supports the following features:

- Message Waiting/Incoming Call indicator
- Four programmable line (DN)/feature keys (self-labeled). One must be the prime DN key.
- Four soft keys (self-labeled) that provide access to multiple features.
- Six icon-labeled fixed feature keys
 - Headset key (and indicator)
 - Directory key
 - Inbox (Message) key
 - Shift key
 - Services key
 - Expand to PC key
- One-line Soft key label display area

- One-line information display area
- Navigation keys (up and down, left and right)
- Goodbye key
- Hold Key
- Handsfree key with indicator
- Mute key and indicator
- Quit key
- Volume control bar
- Integrated switch to support sharing LAN access with a PC or other data device

Features not currently supported

The following features are not supported on the i2004 Internet Telephone:

- Personal Directory
- Call Log and Redial List
- Expansion Modules
- Support of accessory modules
- Live Dial pad
- Group Listening
- Set-to-Set messaging
- Context-sensitive soft keys

The three-port switch that is internal to the i2002 Internet Telephone and internal/external to the i2004 Internet Telephone, is an unmanaged switch. The 802.1Q header is not interpreted by it; rather, it passes the packets (unmodified). The three-port switch provides priority based on the port. The telephone "port" traffic gets priority over the Ethernet.

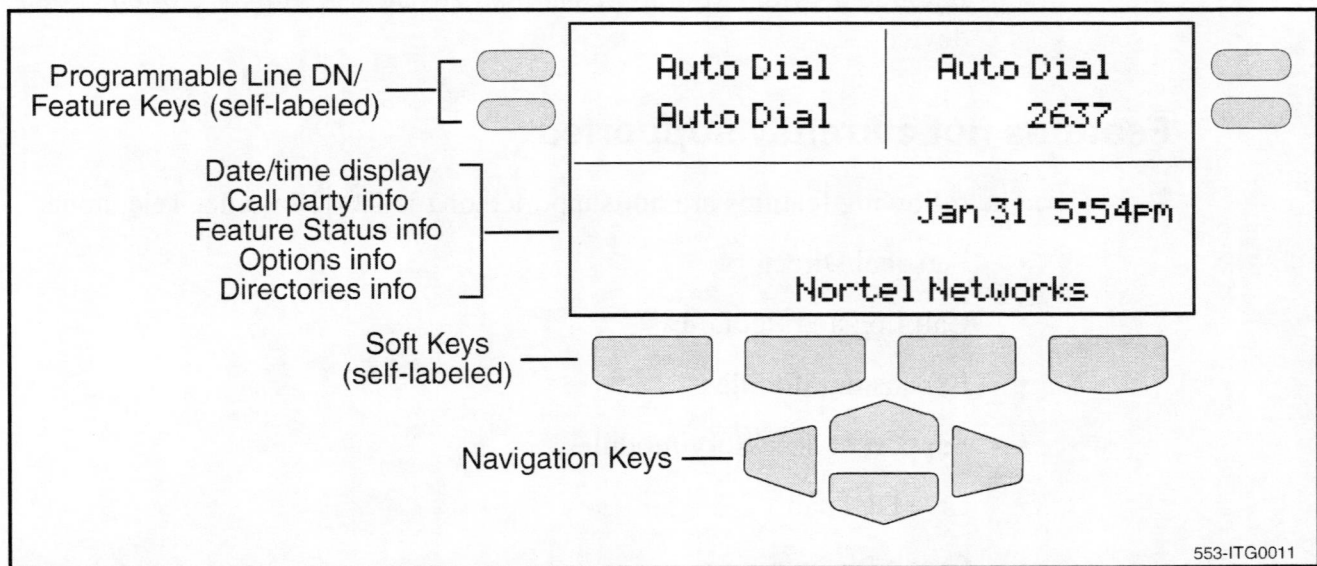
i2002 Internet Telephone display characteristics

An i2002 Internet Telephone has three major display areas:

- Programmable Line (DN)/Feature Key Label
- Soft Key Label
- Information Line

These three display areas are illustrated in Figure 2.

Figure 2
i2002 Internet Telephone display areas



Programmable Line (DN)/Feature Key Label display

The feature key label area displays a ten-character string for each of the four feature keys. Each feature key includes the key label and an icon. The icon state can be on, off, or flashing. Key labels are left-aligned for keys on the left side of the screen, and right-aligned for keys on the right side of the screen.

Note: If a label is longer than ten characters, the last ten characters are displayed and the excess characters are deleted from the beginning of the string.

Soft Key Label display

The soft key label display area displays a maximum six-character string. Each soft key includes the soft key label and an icon. When a soft key is in use, a flashing icon displays at the beginning of the soft key label, and the label shifts one character to the right. If a feature is enabled (for example, call forward is enabled), the icon state turns to on. It remains in the on state until the feature key is pressed again. This cancels the enabled feature and turns the icon off, returning the soft key label to its original string.

Information Line display

An i2002 Internet Telephone has a one-line information display area. The one-line area displays information as follows:

- Caller Number
- Caller Name
- Feature prompt strings
- User-entered digits
- Date and time information (if the telephone is in idle state)

The information area displays different information, according to the telephone's call processing state, active features, and activated features.

i2002 Internet Telephone key number assignments

The i2002 Internet Telephone has four soft-labeled, pre-defined keys that are used to provide up to 10 features. Because they are pre-defined, the user cannot change the key number assignment.

The Message key is numbered 16, as it is on the i2004 Internet Telephone. Key numbers 17-31 are the four soft key labels below the display area. See Figure 1 on page 13.

Key numbers 17 - 31 support the features A03, A06, CFW, CHG, CPN, PRK, PRS, RGA, RPN, SCC, SCU, SSC, SSU and TRN, as listed in Table 1 on page 18.

Key number assignments at the Call Server are aligned with that of the i2004 Internet Telephone. The mappings between i2002 soft key numbers and PBX CPU key numbers are the same as on the i2004 Internet Telephone.

i2002 Internet Telephone dedicated keys

Table 1 describes the telephone assignment functions for each of the dedicated keys. Use LD 11 to program keys 16-26 on the i2002 Internet Telephone.

Note: If you attempt to configure anything other than the permitted response, the system generates an error code.

Table 1
i2002 Internet Telephone dedicated keys

Key Number	Feature	Comments
Key 17	TRN (transfer)	alternate: A03 (3-party conference)
Key 18	A06 (6-party conference)	
Key 19	CFW (call forward)	
Key 20	RGA (ring again)	
Key 21	PRK (call park)	
Key 22	RNP (ringing number pickup)	
Key 23	(reserved for speed dial)	
Key 24	PRS (private release)	
Key 25	CHG (charge account)	
Key 26	CPN (calling party number)	
Keys 27 - 31	reserved	

i2002 Internet Telephone components list

Table 2 lists the i2002 Internet Telephone package components.

Table 2
i2002 Internet Telephone package components (Part 1 of 2)

i2002 Internet Telephone, with North American power supply package, includes: ▪ Telephone handset ▪ i2002 Telephone footstand ▪ Telephone handset cord ▪ 7ft Ethernet cable ▪ Power transformer (117/120 VAC 50/60 Hz) ▪ i2002 Getting started card (English) ▪ i2002 Getting started card (French)	NTDU76AA
i2002 Internet Telephone, without power supply package, includes: ▪ Telephone handset ▪ i2002 Telephone footstand ▪ Telephone handset cord ▪ 7ft Ethernet cable ▪ i2002 Getting started card (English) ▪ i2002 Getting started card (French)	NTDU76BA
Telephone handset cord (Ethergray)	A0788682
8.8ft (2.7m) Telephone handset cord (Charcoal)	A0792037
12ft (3.7 m) Telephone handset cord (Charcoal)	A0855591
Telephone handset (Ethergray)	A0788874
Telephone handset (Charcoal)	A0758634
i2002 Telephone footstand	NTDU84AA
7ft. Ethernet cable category 5	A0648375
i2002/i2004 Power Adaptors	
Power transformer (117/120 VAC 50/60 Hz) (North America)	A0619627

Table 2
i2002 Internet Telephone package components (Part 2 of 2)

Power transformer 3 prong AC to AC, direct plug-in, 8W, 240 VAC, 50Hz to 16 VAC at 500 mA (Ireland and UK)	A0656598
Power transformer AC to AC, direct plug-in, 8W, 230 VAC, 50/60 Hz, to 16 VAC at 500 mA (Europe)	A0619635
Power transformer 2 prong wall plug direct plug-in AC to AC, 8W, 240 VAC, 50 Hz, to 16 VAC at 500 mA (Australia and New Zealand)	A0647042
Power transformer AC to AC, direct plug-in, 8W, 100 VAC, 50 Hz, to 16 VAC at 500 mA	A0828858

Before you begin

The following section provides a step-by-step guide through the i2002 Internet Telephone installation process. Before installing the i2002 Internet Telephone, complete the following pre-installation checklist.

Procedure 1 **Pre-installation checklist**

- 1 Ensure there is one i2002 Internet Telephone boxed package for each i2002 Internet Telephone being installed. The package contains:
 - i2002 Internet Telephone
 - 2.3m (7 foot) Ethernet cable, Category 5
 - Getting Started Guide
 - Telephone handset
 - Telephone handset cord
 - Telephone footstand
- 2 To install and configure an i2002 Internet Telephone, the host system must be installed with the Voice Gateway Media Card.
- 3 If you purchase a telephone that does not include a power supply, ensure that you have a power supply (local or closet) appropriate for the voltage in the designated area.

- 4 Understand the three configuration modes that you can choose from as you proceed through the installation of the i2002 Internet Telephone. The three configuration modes are:
 - Static IP address – see “Static IP address assignment” on page 23.
 - Dynamic Partial DHCP – see “Dynamic IP address assignment — Partial DHCP” on page 23.
 - Dynamic Full DHCP – see “Dynamic IP address assignment — Full DHCP” on page 24.
- 5 A DHCP server and DHCP relay agents, if required, must also be installed, configured, and running.

End of Procedure

i2002 Internet Telephone Startup Sequence

When an i2002 Internet Telephone is connected to the network, it needs to execute a startup sequence. The elements of the startup sequence include:

- obtaining the IP parameters
- finding a gateway server
- authenticating the user

See Table 3 for a summary of the IP parameters and how they are obtained.

Note: For all IP static assignments, your System Administrator provides the network information.

Table 3
i2002 Internet Telephone IP parameters

Parameter	Method of Acquisition
IP Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Net Mask	Manually entered or automatically retrieved through Partial or Full DHCP.
Router Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Connect Server (IP address, port, action and retry count — primary and secondary)	Manually entered or automatically retrieved through Full DHCP.
User ID (Node ID, Node Password and TN)	Manually entered for first-time configuration. Retrieved from local storage on subsequent power cycles. Provided by your System Administrator.

First-time i2002 Internet Telephone installation

During the first-time installation and depending on the type of installation used to configure the Internet Telephone, there are IP address parameters that you may have to enter. As well, you are prompted to enable or disable 802.1Q. For more information, see “802.1Q description” on page 123.

There are three configuration modes that you can choose from to obtain the IP parameters. Review the following sections for more information on the configuration mode that you are using.

Static IP address assignment

During the installation, the Internet Telephone parameters are entered manually using the Internet Telephone's keypad.

Your System Administrator provides the following information: IP address for the Internet Telephone, subnet mask, and the default gateway.

You must also enter the Connect Server parameters including: IP address, port number, action, and retry count.

Go to Procedure 2, “Installing an i2002 Internet Telephone for the first time” on page 24.

Dynamic IP address assignment — Partial DHCP

For a partial DHCP installation, you must provide, through the Internet Telephone's keypad, the Connect Server parameters including: IP address, port number, action, and retry count. Other parameters (Internet Telephone IP address, subnet mask and default gateway) are retrieved from the DHCP server.

The Internet Telephone password, node ID and TN must be entered manually from the keypad.

For more information about DHCP servers, see *IP Line: Description, Installation and Operation* (553-3001-204).

Go to Procedure 3, “Installing an i2002 Internet Telephone for the first time using DHCP” on page 29.

Dynamic IP address assignment — Full DHCP

For a full DHCP installation, all parameters (Internet Telephone IP address, subnet mask, default gateway, Connect Server IP address, port number, action and retry count) are retrieved from the DHCP server to recognize the i2002 Internet Telephone.

The Internet Telephone password, node ID and TN must be entered manually from the keypad.

For more information on how to set up DHCP servers for use with the Internet Telephones, refer to *IP Line: Description, Installation and Operation* (553-3001-204).

Go to Procedure 3, “Installing an i2002 Internet Telephone for the first time using DHCP” on page 29.

Procedure 2

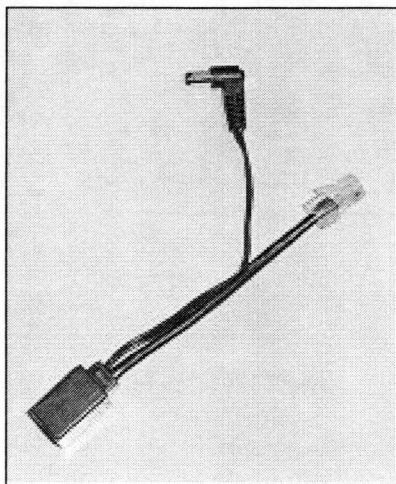
Installing an i2002 Internet Telephone for the first time

- 1** Configure a virtual loop on the system using LD 97.
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 2** Configure the i2002 Internet Telephone on the system using LD 11.
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3** Connect the i2002 Internet Telephone components:
 - a.** Connect one end of the handset cord to the handset jack on the back of the telephone identified with a handset icon.
 - b.** Connect the other end of the handset cord to the handset.
- 4** Power the i2002 Internet Telephone using either the Power over LAN Hub™ (closet power) or an AC power transformer (local power).
 - a.** If local power is used, plug the AC power transformer into the nearest power outlet. Ensure the correct AC power transformer is used for the country. Connect the power jack as shown in Figure 4. Be sure to

thread the cord around the retaining hook to provide strain relief for a secure power connection.

- b. If using the Power over LAN Hub™, a power splitter is required to split the power from the CAT-5 line cable (see Figure 3 and Figure 7 on page 52. Refer to the Power over LAN Hub™ User Guide included in the Power over LAN Hub™ package for more details on configuring power over LAN.

Figure 3
Power splitter



- c. Choose one of the following connections:

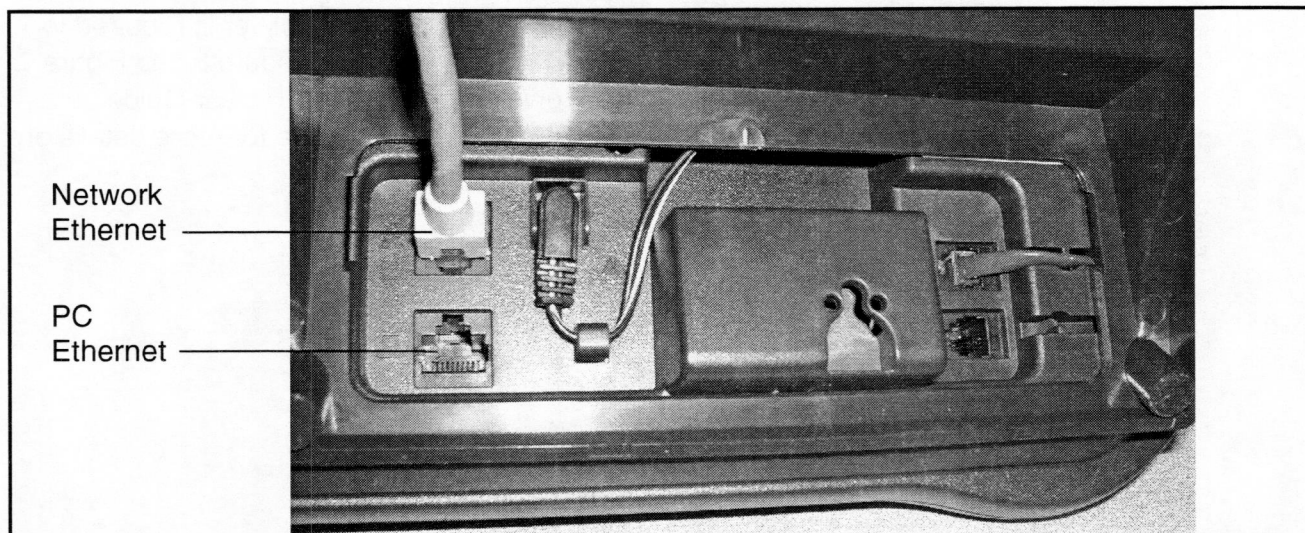
- i. For a telephone not sharing LAN access with a PC:

Connect one end of the CAT-5 line cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon, see Figure 4). The other end of the CAT-5 line cable plugs into the IP network.

- ii. For a telephone sharing LAN access with a PC:

Connect one end of the CAT-5 line cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon, see Figure 4) and the other end to the IP network. Insert a second CAT-5 line cable into the PC ethernet jack located on the back of the telephone (identified with a PC icon, see Figure 4) and the other end into the computer.

Figure 4
i2002 Ethernet port connections



IMPORTANT!

Timing information

There are only four seconds between plugging in the i2002's power transformer and the appearance of the Nortel Networks logo on the display. When you see the logo, you have one second to respond by pressing the four feature keys at the bottom of the display in sequence from left to right. If you miss the one second response time, the i2002 Internet Telephone attempts to locate the connect server. Wait until it is finished, and then begin the power up sequence again.

- 5 Reset the i2002 Internet Telephone by unplugging and replugging the power jack.
- 6 When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
- 7 At the prompt DHCP Yes/No?, select **No**.

- 8 Enter the following information provided by your System Administrator:

Screen prompt	Description
set IP	A valid i2002 Internet Telephone IP address.
net msk	A subnet mask.
def gw	The default gateway for the i2002 Internet Telephone on the LAN segment to which it is connected.

Note: The Internet Telephone can support a primary (S1) and secondary (S2) connect server. However, for Meridian 1 and CSE 1000 systems, the information entered for the primary connect server must be identical to the secondary connect server.

- 9 Enter the information for the primary Connect Server (S1) and the secondary Connect Server (S2):

Screen prompt	Description
S1 IP	The node IP address of the IP line node.
S1 Port	This is a fixed value: 4100
S1 action	This is a fixed value: 1
S1 retry	The number of times the Internet Telephone attempts to connect to the server. Enter 10.
S2 IP	Same as S1
S2 Port	Same as S1
S2 action	Same as S1
S2 retry	Same as S1

After the S1 and S2 server information is entered, the VLAN option appears on the display:

Screen prompt	Description
0-No	Disable 802.1Q and complete the configuration of the Internet Telephone. 0-No is the default value.
1-Yes	Enable the 802.1Q header.

- 10 If 802.1Q is *not* required, go to step 12, otherwise select 1-Yes to display the following VLAN ID:

Manual Cfg

VLAN: 1234

Note: The VLAN ID is entered as a decimal number. The VLAN ID is a 12-bit value between 0 and 4095.

- 11 Enter a valid value and press **OK**.

The Internet Telephone is configured with 802.1Q enabled, priority = 6, and the VLAN ID set to the entered value.

The i2002 Internet Telephone searches for the connect server. When the connection is complete, proceed with step 12.

- 12 Enter the following information provided by your System Administrator:

Screen prompt	Description
Password	Internet Telephone Installer Password You are not prompted to enter the Internet Telephone Installer Password if it has not been configured in your system.
Node	The node ID.
TN	The TN or VTN.

The i2002 Internet Telephone registers with the Terminal Proxy Server (TPS) and if needed, begins the firmware download. This takes several minutes. When complete, the i2002 Internet Telephone resets.

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 13 Check for dial tone and the correct DN above the display.
- 14 Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 15 (Optional) Customize the Feature Keys as required. For more information, see "Configure programmable line (DN)/feature key labels" on page 117.

End of Procedure

Procedure 3**Installing an i2002 Internet Telephone for the first time using DHCP**

- 1** Complete steps 1–5 from Procedure 2 on page 24.
- 2** When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
- 3** At the prompt DHCP Yes/No?, select **Yes**.
- 4** Select Partial or Full DHCP.
 - a.** If you select Full DHCP, then the following parameters are retrieved from the DHCP server:
 - A valid i2002 Internet Telephone IP address.
 - A subnet mask.
 - The default gateway for the i2002 Internet Telephone on the LAN segment to which it is connected.
 - The node IP address of the IP line node.
 - The S1 Action.
 - The retry count. This is the number of times the Internet Telephone attempts to connect to the server.

- b. If you select Partial DHCP, then you must enter the following parameters:

Screen prompt	Description
S1 IP	The node IP address of the IP line node.
S1 Port	This is a fixed value: 4100
S1 action	This is a fixed value: 1
S1 retry	The number of times the Internet Telephone attempts to connect to the server. Enter 10.
S2 IP	Same as S1
S2 Port	Same as S1
S2 action	Same as S1
S2 retry	Same as S1

Note: The Internet Telephone can support a primary (S1) and secondary (S2) connect server. However, for Meridian 1 and Succession CSE 1000 systems, the information entered for the primary connect server must be identical to the secondary connect server.

After the Partial or Full DHCP steps are completed, the VLAN option appears on the display.

- 5 Select either **1-Ma** or **2-Au** to enable 802.1Q from the DHCP Enabled - VLAN Options menu.

Screen prompt	Description
0-No	802.1Q remains off and initialization continues. 0-No is the default value. If this is selected, proceed to step 7 to continue the Internet Telephone configuration.
1-Ma	Enter a VLAN ID manually. If this is selected, proceed to step 6 to continue the 802.1Q configuration.
2-Au	Automatically enter a VLAN ID using DHCP. DHCP auto discovers the VLAN ID. No further steps are required to configure 802.1Q on the Internet Telephone. If this is selected, proceed to step 7 to continue the Internet Telephone configuration.

If **1-Ma** is selected, then the following VLAN ID displays:

Manual Cfg

VLAN: 1234

Note: The VLAN ID is entered as a decimal number. The VLAN ID is a 12-bit value between 0 and 4095.

- 6** Enter a valid value and press **OK**.

The Internet Telephone is configured with 802.1Q enabled, priority = 6, and the VLAN ID set to the entered value.

The i2002 Internet Telephone searches for the connect server. When the connection is complete, proceed to step 7.

- 7** Enter the following information provided by your System Administrator.

Screen prompt	Description
Password	Internet Telephone Installer Password You are not prompted to enter the Internet Telephone Installer Password if it has not been configured in your system.
Node	The node ID.
TN	The TN or VTN.

The i2002 Internet Telephone registers with the TPS and if needed, begins the firmware download. This takes several minutes. When complete, the i2002 Internet Telephone resets.

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 8** Check for dial tone and the correct DN above the display.
- 9** Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 10** (Optional) Customize the Feature Keys as required. For more information, see "Configure programmable line (DN)/feature key labels" on page 117.

End of Procedure

i2002 Internet Telephone power cycle description

The power cycle is similar to the initial installation. The i2002 Internet Telephone saves its firmware, IP parameters, Node Number, and TN in memory. As the i2002 Internet Telephone proceeds through a start-up sequence, it does not need to:

- re-enter the IP parameters
- reacquire firmware or prompt the user for Node Number and TN

When the power is down on the i2002 Internet Telephone, LAN access is not available for the PC or other data devices connected to the Internet Telephone. Access is restored when power is restored to the i2002 Internet Telephone.

Reinstalling an i2002 Internet Telephone

You can reinstall an existing, previously-configured i2002 Internet Telephone on the same system. For example, the i2002 Internet Telephone can be assigned to a new user (new TN) or to an existing user who moved to a new subnet by changing the TN of the Internet Telephone.

Procedure 4

Changing the TN of an existing i2002 Internet Telephone

- 1 Repower the i2002 Internet Telephone.
- 2 If node password is not enabled:
 - a. Press **OK** when the node number displays.
A TN screen displays.
 - b. Select the **Clear** soft key to clear the existing TN.
A new parameters prompt displays.

Note: During the reboot sequence of a previously configured Internet Telephone, the i2002 Internet Telephone displays the existing node number for approximately 5 seconds.

- 3 If node password is enabled and is not NULL:
 - a. Press **OK** when node number displays.
A password screen displays.

- b. Enter correct password, and press **OK**.

A TN screen displays.

- c. Select the Clear soft key to clear the existing TN.

A new parameters prompt displays.

Note: During the reboot sequence of a previously configured Internet Telephone, the i2002 displays the existing node number for approximately 5 seconds.

- 4 If node password is enabled and NULL, choose one of the following:
 - a. Disable password and complete step 2.
 - b. Set password as non-NULL and complete step 3.

End of Procedure

Replacing an i2002 Internet Telephone

IMPORTANT!

Two telephones cannot share the same TN. You must remove the i2002 Internet Telephone that is currently using the TN.

Procedure 5

Replacing an i2002 Internet Telephone

- 1 Disconnect the i2002 Internet Telephone that you want to replace.
- 2 Follow Procedure 2 on page 24 (static IP assignment) or Procedure 3 on page 29 (dynamic IP assignment) to install and configure the i2002 Internet Telephone.
- 3 Enter the same TN and Node Number as the i2002 Internet Telephone you replaced. The system associates the new i2002 Internet Telephone with the existing TN.

End of Procedure

Removing an i2002 from service

Procedure 6

Removing an i2002 Internet Telephone from service

- 1 Disconnect the i2002 Internet Telephone from the network or turn off the power.

Note: The service to the PC is disconnected as well if the PC is connected to the Internet Telephone.

If the i2002 Internet Telephone was automatically configured, the DHCP lease expires and the IP address returns to the available pool.

- 2 In LD 11, OUT the TN.

End of Procedure

i2004 Internet Telephone

Contents

This section contains information on the following topics:

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Removing an i2004 Internet Telephone from service	62

Reference list

The following are the references for this section:

- *IP Line: Description, Installation and Operation* (553-3001-204)
- *Software Input/Output: Administration* (553-3001-311)
- *i2004 Internet Telephone User Guide*

Overview

This section explains how to install and maintain the i2004 Internet Telephone.

This section contains the following procedures:

- Procedure 7, “Pre-installation checklist” on page 48.
- Procedure 8, “Installing an i2004 Internet Telephone for the first time” on page 53.
- Procedure 9, “Installing an i2004 Internet Telephone for the first time using DHCP” on page 57.
- Procedure 10, “Changing the TN of an existing i2004 Internet Telephone” on page 60.
- Procedure 11, “Replacing an i2004 Internet Telephone” on page 61.
- Procedure 12, “Removing an i2004 Internet Telephone from service” on page 62.

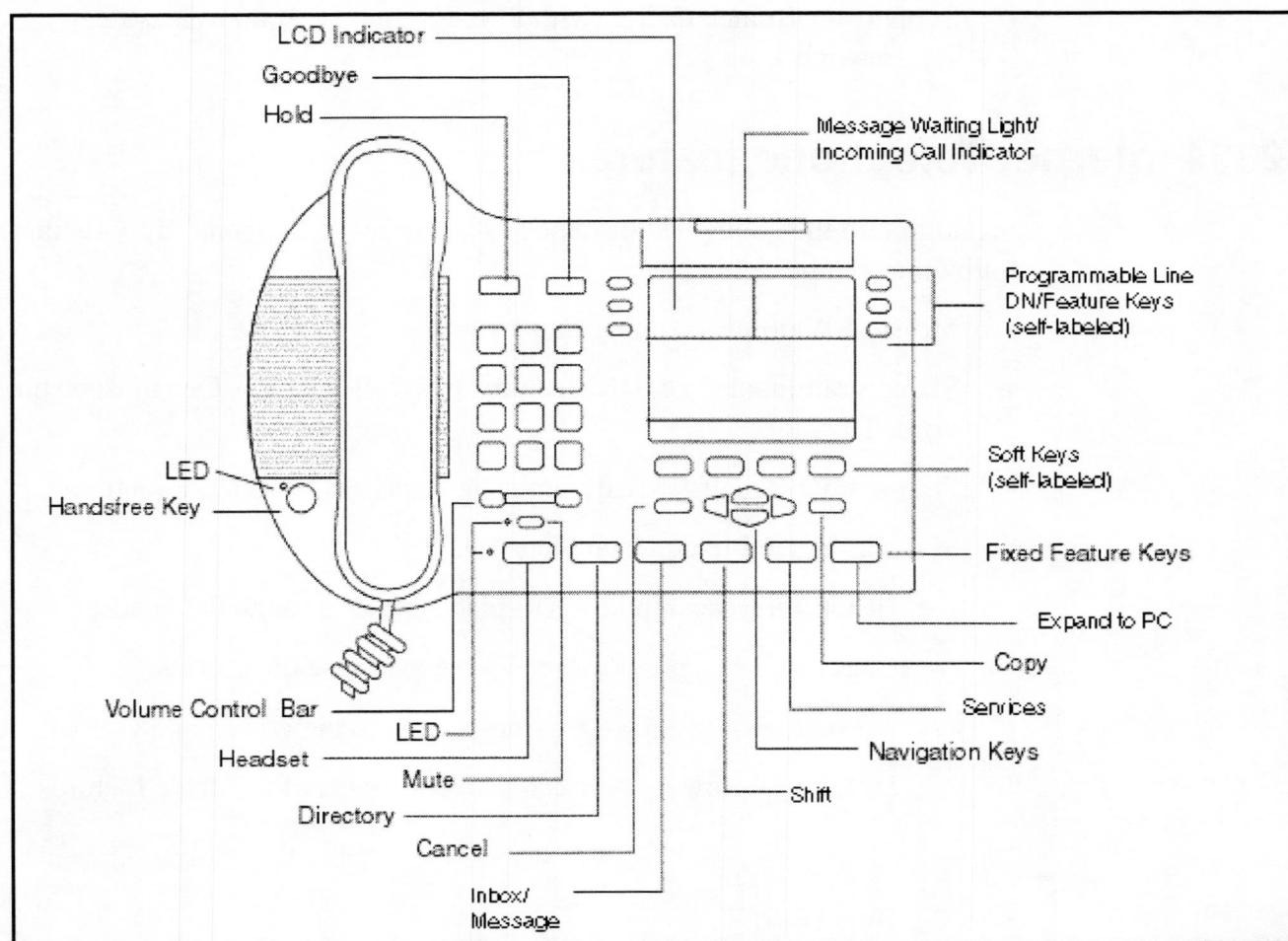
i2004 Internet Telephone description

The i2004 Internet Telephone connects directly to the LAN through an Ethernet connection and brings voice and data to the desktop environment.

The i2004 Internet Telephone translates voice into data packets for transport using Internet Protocol. A Dynamic Host Configuration Protocol (DHCP) server can be used to provide information that enables the i2004 Internet Telephone network connection, and connection to the Voice Gateway Media Card. The i2004 Internet Telephone uses the customer's IP network to communicate with the Call Server.

See Figure 5 on page 37.

Figure 5
i2004 Internet Telephone components



New Supported features

The i2004 Internet Telephone supports the following new features that are also supported on the i2002 Internet Telephone:

- 802.1Q VLAN and Layer 2 priority bit support, an industry standard for managing bandwidth usage.
- NAT support improvement.
- Ability to change the feature key labels (with Succession CSE 1000 Release 2.0 systems only).
- Corporate Directory (with Succession CSE 1000 Release 2.0 systems only).
- Support for Virtual office (with Succession CSE 1000 Release 2.0 systems only).
- Support for Branch Office (with Succession CSE 1000 Release 2.0 systems only).

i2004 Internet Telephone features

In addition to the above features, the i2004 Internet Telephone supports the following telephone features:

- Message Waiting/Incoming Call indicator
- Six programmable line (DN)/feature keys (self-labeled). One must be the prime DN key.
- Four soft keys (self-labeled) that provide access to multiple features.
- Six icon-labeled fixed feature keys
 - Headset key (and indicator) - places a call through the headset
 - Directory key - provides access the available directories
 - Inbox (Message) key - provides access to the voicemail system
 - Shift key - provides access to a second page of available features

- Services key - provides access to the telephone options, and if configured, to the Virtual Office and Branch Office options
- Expand to PC key - reserved for future development
- One-line Soft key label display area
- Three-line information display area
- Navigation keys (up and down, left and right)
- Goodbye key
- Hold Key
- Handsfree key with indicator
- Mute key and indicator
- Quit key
- Volume control bar
- Switch to support sharing LAN access with a PC or other data device (internal / external)

Features not currently supported

The following features are not supported on the i2004 Internet Telephone:

- Personal Directory
- Call Log and Redial List
- Expansion Modules
- Support of accessory modules
- Live Dial pad
- Group Listening
- Set-to-Set messaging
- Context-sensitive soft keys

The three-port switch that is internal to the i2002 Internet Telephone and internal/external to the i2004 Internet Telephone, is an unmanaged switch. The 802.1Q header is not interpreted by it; rather, it passes the packets (unmodified). The three-port switch provides priority based on the port (that is, the telephone "port" traffic gets priority over the Ethernet).

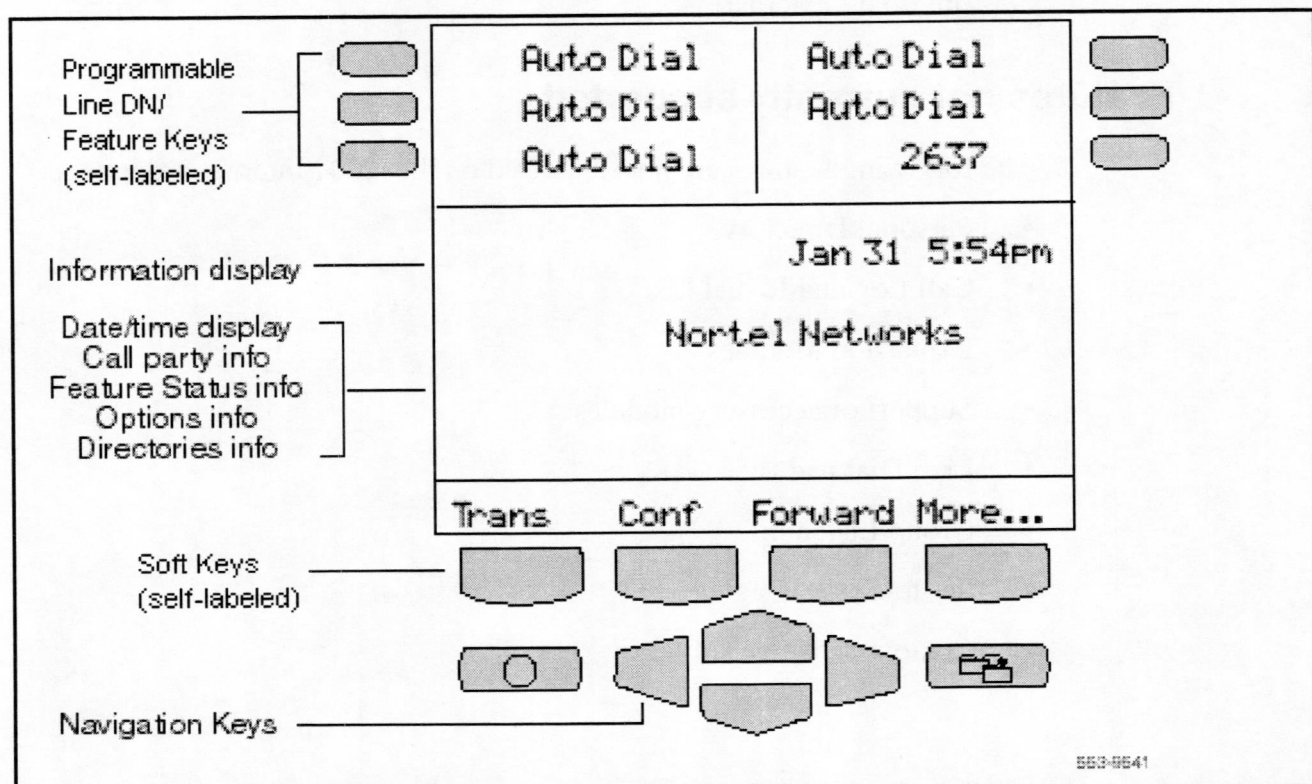
i2004 Internet Telephone display characteristics

An i2004 Internet Telephone has three major display areas:

- Programmable Line (DN)/Feature Key Label
- Soft Key Label
- Information Line

These three display areas are illustrated in Figure 6.

Figure 6
i2004 Internet Telephone display areas



Programmable Line (DN)/Feature Key Label display

The feature key label area displays a ten-character string for each of the four feature keys. Each feature key includes the key label and an icon. The icon state can be on, off, or flashing. Key labels are left-aligned for keys on the left side of the screen, and right-aligned for keys on the right side of the screen.

Note: If a label is longer than ten characters, the last ten characters are displayed and the excess characters are deleted from the beginning of the string.

Soft Key Label display

The soft key label display area displays a maximum six-character string. Each soft key includes the soft key label and an icon. When a soft key is in use, a flashing icon displays at the beginning of the soft key label, and the label shifts one character to the right. If a feature is enabled (for example, call forward is enabled), the icon state turns to on. It remains in the on state until the feature key is pressed again. This cancels the enabled feature and turns the icon off, returning the soft key label to its original string.

Information Line display

An i2004 Internet Telephone has a three-line information display area. The area displays information as follows:

- Caller number
- Caller name
- Feature prompt strings
- User-entered digits
- Date and time information (if the telephone is in idle state)

The information area displays different information, according to the telephone's call processing state and active and activated features.

i2004 Internet Telephone dedicated keys

Table 4 describes the telephone assignment functions. Use LD 11 to program keys 16-26 on the i2004 Internet Telephone.

Note: If you attempt to configure anything other than the permitted response, the system generates an error code.

Table 4
i2004 Internet Telephone dedicated keys (Part 1 of 2)

Key number	Response	Description
Key 16	MWK	Message Waiting key
	NUL	Removes function or feature from key
Key 17	TRN	Call Transfer key
	NUL	Removes function or feature from key
Key 18	A03	three-party conference key
	A06	six-party conference key
	NUL	Removes function or feature from key
Key 19	CFW	Call Forward key
	NUL	Removes function or feature from key
Key 20	RGA	Ring Again key
	NUL	Removes function or feature from key
Key 21	PRK	Call Park key
	NUL	Removes function or feature from key
Key 22	RNP	Ringing Number pickup key
	NUL	Removes function or feature from key

Table 4
i2004 Internet Telephone dedicated keys (Part 2 of 2)

Key number	Response	Description
Key 23	SCU	Speed Call User
	SSU	System Speed Call User
	SCC	Speed Call Controller
	SSC	System Speed Call Controller
	NUL	Removes function or feature from key
Key 24	PRS	Privacy Release key
	NUL	Removes function or feature from key
Key 25	CHG	Charge Account key
	NUL	Removes function or feature from key
Key 26	CPN	Calling Party Number key
	NUL	Removes function or feature from key

i2004 Internet Telephone components list

Table 5 lists the i2004 Internet Telephone package components. Table 6 on page 46 lists the i2004 Internet Telephone package components for telephones with an integrated three-port switch.

Table 5
i2004 Internet Telephone component list (Part 1 of 2)

i2004 Internet Telephone, with North American power supply package, includes: ▪ Telephone handset ▪ i2004 Telephone footstand ▪ Telephone handset cord ▪ 7ft Ethernet cable ▪ Power transformer (117/120 VAC 50/60 Hz) ▪ i2004 Getting Started Card (English) ▪ i2004 Getting Started Card (French)	NTEX00BA
i2004 Internet Telephone, without power supply package, includes: ▪ Telephone handset ▪ i2004 Telephone footstand ▪ Telephone handset cord ▪ 7ft Ethernet cable ▪ i2004 Getting Started Card (English) ▪ i2004 Getting Started Card (French)	NTEX00BB
Telephone handset cord	A0788682
6ft Telephone handset cord (Charcoal)	A0720562
9ft Telephone handset cord (Charcoal)	A0720560
12ft Telephone handset cord (Charcoal)	A0729558
Telephone handset	A0788874
Telephone handset (Charcoal)	A0758634
i2004 Telephone footstand	P0886045
7ft. Ethernet cable category 5	A0648375

Table 5
i2004 Internet Telephone component list (Part 2 of 2)

i2002/i2004 Power Adaptors	
Power transformer (117/120 VAC 50/60 Hz) (North America)	A0619627
Power transformer 3 prong AC to AC, direct plug-in, 8W, 240 VAC, 50Hz to 16 VAC at 500 mA (Ireland and UK)	A0656598
Power transformer AC to AC, direct plug-in, 8W, 230 VAC, 50/60 Hz, to 16 VAC at 500 mA (Europe)	A0619635
Power transformer 2 prong wall plug direct plug-in AC to AC, 8W, 240 VAC, 50 Hz, to 16 VAC at 500 mA (Australia and New Zealand)	A0647042
Power transformer AC to AC, direct plug-in, 8W, 100 VAC, 50 Hz, to 16 VAC at 500 mA	A0828858

Table 6
i2004 Internet Telephone with integrated switch component list (Part 1 of 2)

i2004 Internet Telephone, with North American power supply package, includes: ▪ Telephone handset ▪ i2004 Telephone footstand w. Cable Guide ▪ Telephone handset cord ▪ 7ft Ethernet cable ▪ Power transformer (117/120 VAC 50/60 Hz) ▪ i2004 Getting Started Card (English) ▪ i2004 Getting Started Card (French)	NTDU82AA
i2004 Internet Telephone, without power supply package, includes: ▪ Telephone handset ▪ i2004 Telephone footstand ▪ Telephone handset cord ▪ 7ft Ethernet cable ▪ i2004 Getting Started Card (English) ▪ i2004 Getting Started Card (French)	NTEX00BB
Telephone handset cord	A0788682
6ft Telephone handset cord (Charcoal)	A0720562
9ft Telephone handset cord (Charcoal)	A0720560
12ft Telephone handset cord (Charcoal)	A0729558
Telephone handset	A0788874
Telephone handset (Charcoal)	A0758634
i2004 Telephone footstand w. Cable Guide	NTDU85AA
7ft. Ethernet cable category 5	A0648375
i2002/i2004 Power Adaptors	
Power transformer (117/120 VAC 50/60 Hz) (North America)	A0619627

Table 6**i2004 Internet Telephone with integrated switch component list (Part 2 of 2)**

Power transformer 3 prong AC to AC, direct plug-in, 8W, 240 VAC, 50Hz to 16 VAC at 500 mA (Ireland & UK)	A0656598
Power transformer AC to AC, direct plug-in, 8W, 230 VAC, 50/60 Hz, to 16 VAC at 500 mA (Europe)	A0619635
Power transformer 2 prong wall plug direct plug-in AC to AC, 8W, 240 VAC, 50 Hz, to 16 VAC at 500 mA (Australia and New Zealand)	A0647042
Power transformer AC to AC, direct plug-in, 8W, 100 VAC, 50 Hz, to 16 VAC at 500 mA	A0828858

Before you begin

The following section provides a step-by-step guide through the i2004 Internet Telephone installation process. Before installing the i2004 Internet Telephone, complete the following pre-installation checklist.

Procedure 7

Pre-installation checklist

- 1 Ensure there is one i2004 Internet Telephone boxed package for each i2004 Internet Telephone being installed. The package contains:
 - i2004 Internet Telephone
 - 2.3m (7 foot) Ethernet cable, Category 5
 - Getting Started Guide
 - Telephone handset
 - Telephone handset cord
 - Telephone footstand
- 2 To install and configure an i2004 Internet Telephone, the host system must be installed with the Voice Gateway Media Card.
- 3 Ensure that you have a power supply (local or closet) appropriate for the voltage in the designated area (if you purchase a telephone that does not include a power supply).
- 4 Understand the three configuration modes that you can choose from as you proceed through the installation of the i2004 Internet Telephone. The three configuration modes are:
 - Static IP address – see “Static IP address assignment” on page 51.
 - Dynamic Partial DHCP – see “Dynamic IP address assignment — Partial DHCP” on page 51.
 - Dynamic Full DHCP – see “Dynamic IP address assignment — Full DHCP” on page 51.
- 5 A DHCP server and DHCP relay agents, if required, must also be installed, configured, and running.

End of Procedure

i2004 Internet Telephone Startup Sequence

When an i2004 Internet Telephone is connected to the network, it needs to execute a startup sequence. The elements of the startup sequence include:

- obtaining the IP parameters
- finding a gateway server
- authenticating the user

See Table 7 for a summary of the IP parameters and how they are obtained.

Note: For all IP static assignments, your System Administrator provides the network information.

Table 7
i2004 Internet Telephone IP parameters

Parameter	Method of Acquisition
IP Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Net Mask	Manually entered or automatically retrieved through Partial or Full DHCP.
Router Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Connect Server (IP address, port, action and retry count — primary and secondary)	Manually entered or automatically retrieved through Full DHCP.
User ID (Node ID, Node Password and TN)	Manually entered for first-time configuration. Retrieved from local storage on subsequent power cycles. Provided by your System Administrator.

First-time i2004 Internet Telephone installation

To install and configure an i2004 Internet Telephone, you must first install an Voice Gateway Media Card in the system.



CAUTION

Damage to Equipment

Do not plug your i2004 Internet Telephone into an ISDN connection. Severe damage can result. Consult your system administrator to ensure that you are plugging your telephone into a 10/100BaseT Ethernet jack.

Installation scenarios

There are four possible i2004 Internet Telephone installation scenarios:

- i2004 Internet Telephone (with integrated switch) and local power
- i2004 Internet Telephone (with integrated switch) and closet power
- i2004 Internet Telephone (without integrated switch) and local power
- i2004 Internet Telephone (without integrated switch) and closet power

Figure 7 on page 52 shows the different wiring connections depending on the telephone and the power source.

IP address assignments

During the first-time installation and depending on the type of installation used to configure the Internet Telephone, there are IP address parameters that you may have to enter.

There are three configuration modes that you can choose from to obtain the IP parameters. Review the following sections for more information on the configuration mode that you are using.

Static IP address assignment

During the installation, the Internet Telephone parameters are entered manually using the Internet Telephone's keypad.

Your System Administrator provides the following information: IP address for the Internet Telephone, subnet mask, and the default gateway.

You must also enter the Connect Server parameters including: IP address, port number, action, and retry count.

Go to Procedure 8, "Installing an i2004 Internet Telephone for the first time" on page 53.

Dynamic IP address assignment — Partial DHCP

For a partial DHCP installation, you must provide, through the Internet Telephone's keypad, the Connect Server parameters including: IP address, port number, action, and retry count. Other parameters (Internet Telephone IP address, subnet mask and default gateway) are retrieved from the DHCP server.

The Internet Telephone password, node ID and TN must be entered manually from the keypad.

For more information about DHCP servers, see *IP Line: Description, Installation and Operation* (553-3001-204).

Go to Procedure 9, "Installing an i2004 Internet Telephone for the first time using DHCP" on page 57.

Dynamic IP address assignment — Full DHCP

For a full DHCP installation, all parameters (Internet Telephone IP address, subnet mask, default gateway, Connect Server IP address, port number, action and retry count) are retrieved from the DHCP server to recognize the i2004 Internet Telephone.

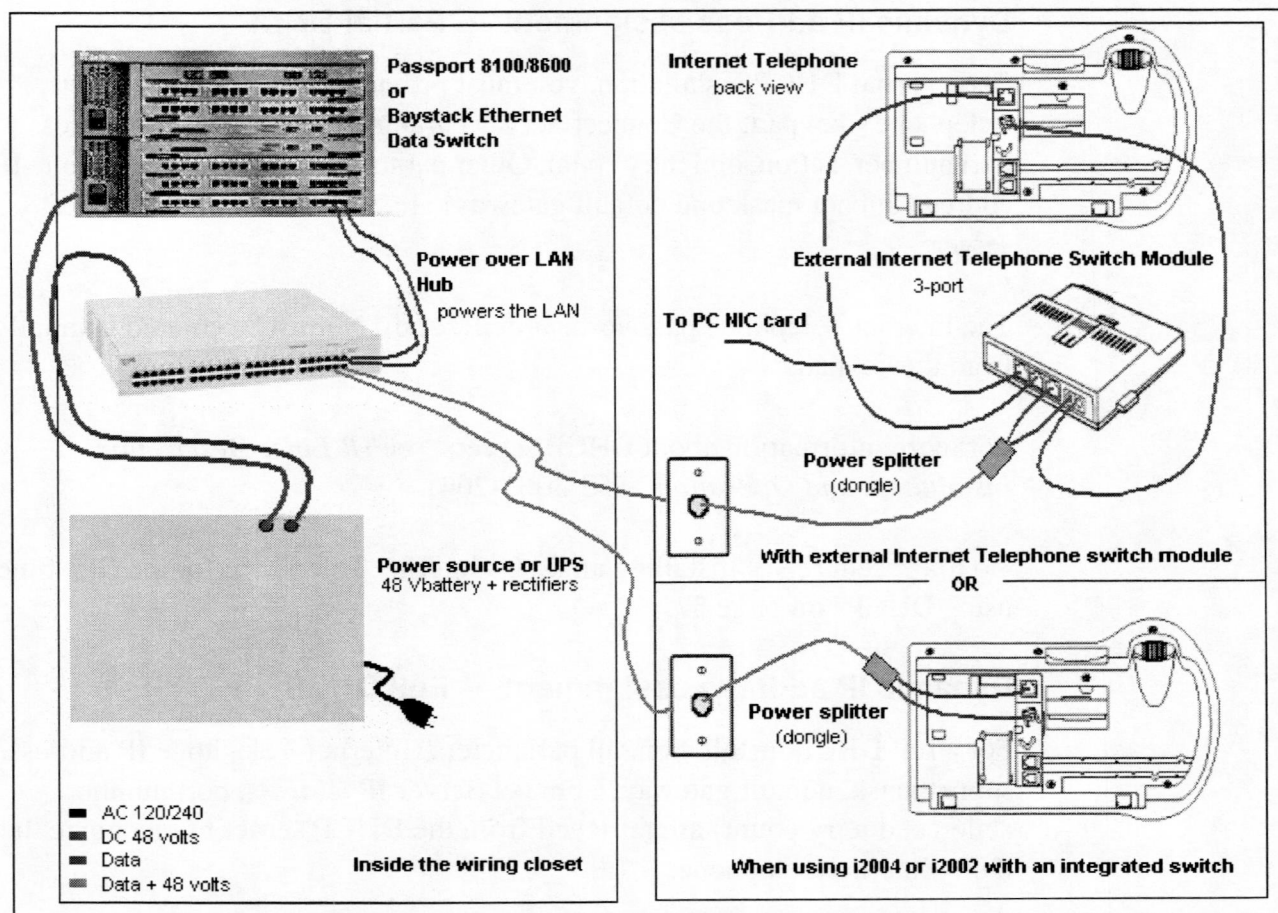
The Internet Telephone password, node ID and TN must be entered manually from the keypad.

Go to Procedure 9, "Installing an i2004 Internet Telephone for the first time using DHCP" on page 57.

802.1Q

You are prompted to enable or disable 802.1Q. For more information about 802.1Q, see "802.1Q description" on page 123.

Figure 7
i2004 Internet Telephone Wiring



Procedure 8**Installing an i2004 Internet Telephone for the first time**

- 1** Configure a virtual loop on the system using LD 97.
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 2** Configure the i2004 Internet Telephone on the system using LD 11.
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3** Connect the i2004 Internet Telephone components:
 - a.** Connect one end of the handset cord to the handset jack on the back of the telephone identified with a handset icon.
 - b.** Connect the other end of the handset cord to the handset.
- 4** Power the i2004 Internet Telephone using either the Power over LAN Hub™ (closet power) or an AC power transformer (local power).
 - a.** If local power is used, plug the AC power transformer into the nearest power outlet. Ensure the correct AC power transformer is used for the country. Connect the power jack. Be sure to thread the cord around the retaining hook to provide strain relief for a secure power connection.
 - b.** If using the Power over LAN Hub™, a power splitter is required to split the power from the CAT-5 line cable (see Figure 3 on page 25 and Figure 7 on page 52). Refer to the Power over LAN Hub™ User Guide included in the Power over LAN Hub™ package for more details on configuring power over LAN.
 - c.** Choose one of the following connections:
 - i.** For a telephone not sharing a LAN access with a PC:

Connect one end of the CAT-5 line cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon). The other end of the CAT-5 line cable plugs into the IP network.

- ii. For a telephone sharing a LAN access with a PC:

Connect one end of the CAT-5 line cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon) and the other end to the IP network. Insert a second CAT-5 line cable into the PC ethernet jack located on the back of the telephone (identified with a PC icon) and the other end into the computer.

IMPORTANT!

Timing information

There are only four seconds between plugging in the i2004's power transformer and the appearance of the Nortel Networks logo on the display. When you see the logo, you have one second to respond by pressing the four feature keys at the bottom of the display in sequence from left to right. If you miss the one second response time, the i2004 attempts to locate the connect server. Wait until it is finished, and then begin the power up sequence again.

- 5 Reset the i2004 Internet Telephone by unplugging and replugging the power jack.
- 6 When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
- 7 At the prompt DHCP Yes/No?, select **No**.
- 8 Enter the following information provided by your System Administrator:

Screen prompt	Description
set IP	A valid i2004 Internet Telephone IP address.
net msk	A subnet mask.
def gw	The default gateway for the i2004 Internet Telephone on the LAN segment to which it is connected.

Note: The Internet Telephone can support a primary (S1) and secondary (S2) connect server. However, for Meridian 1 and Succession CSE 1000 systems, the information entered for the primary connect server must be identical to the secondary connect server.

- 9 Enter the information for the primary Connect Server (S1) and the secondary Connect Server (S2):

Screen prompt	Description
S1 IP	The node IP address of the IP line node.
S1 Port	This is a fixed value: 4100
S1 action	This is a fixed value: 1
S1 retry	The number of times the Internet Telephone attempts to connect to the server. Enter 10.
S2 IP	Same as S1
S2 Port	Same as S1
S2 action	Same as S1
S2 retry	Same as S1

After the S1 and S2 server information is entered, the VLAN option appears on the display:

Screen prompt	Description
0-No	Disable 802.1Q and complete the configuration of the Internet Telephone. 0-No is the default value.
1-Yes	Enable the 802.1Q header.

- 10 If 802.1Q is *not* required, go to step 12, otherwise select **1-Yes** to display the following VLAN ID:

Manual Cfg
VLAN: 1234

Note: The VLAN ID is entered as a decimal number. The VLAN ID is a 12-bit value between 0 and 4095.

- 11 Enter a valid value and press **OK**.

The Internet Telephone is configured with 802.1Q enabled, priority = 6, and the VLAN ID set to the entered value.

The i2004 Internet Telephone searches for the connect server. When the connection is complete, proceed with step 12.

- 12** Enter the following information provided by your System Administrator:

Screen prompt	Description
Password	Internet Telephone Installer Password You are not prompted to enter the Internet Telephone Installer Password if it has not been configured in your system.
Node	The node ID.
TN	The TN or VTN.

The i2004 Internet Telephone registers with the TPS and if needed, begins the firmware download. This takes several minutes. When complete, the i2004 Internet Telephone resets.

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 13** Check for dial tone and the correct DN above the display.
- 14** Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 15** (Optional) Customize the Feature Keys as required. For more information, see "Configure programmable line (DN)/feature key labels" on page 117.

End of Procedure

Procedure 9**Installing an i2004 Internet Telephone for the first time using DHCP**

- 1** Complete steps 1–5 from Procedure 8 on page 53.
- 2** When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
- 3** At the prompt DHCP Yes/No?, select **Yes**.
- 4** Select Partial or Full DHCP.
 - a.** If you select Full DHCP, then the following parameters are retrieved from the DHCP server:
 - A valid i2004 Internet Telephone IP address.
 - A subnet mask.
 - The default gateway for the i2004 Internet Telephone on the LAN segment to which it is connected.
 - The node IP address of the IP line node.
 - The S1 Action.
 - The retry count. This is the number of times the Internet Telephone attempts to connect to the server.

- b. If you select Partial DHCP, then you must enter the following parameters:

Screen prompt	Description
S1 IP	The node IP address of the IP line node.
S1 Port	This is a fixed value: 4100
S1 action	This is a fixed value: 1
S1 retry	The number of times the Internet Telephone attempts to connect to the server. Enter 10.
S2 IP	Same as S1
S2 Port	Same as S1
S2 action	Same as S1
S2 retry	Same as S1

Note: The Internet Telephone can support a primary (S1) and secondary (S2) connect server. However, for Meridian 1 and Succession CSE 1000 systems, the information entered for the primary connect server must be identical to the secondary connect server.

After the Partial or Full DHCP steps are completed, the VLAN option appears on the display.

- 5 Select **1-Ma** or **2-Au** to enable 802.1Q from the DHCP Enabled - VLAN Options menu.

Screen prompt	Description
0-No	802.1Q remains off and initialization continues. 0-No is the default value. If this is selected, proceed to step 7 to continue the Internet Telephone configuration.
1-Ma	Enter a VLAN ID manually. If this is selected, proceed to step 6 to continue the 802.1Q configuration.
2-Au	Automatically enter a VLAN ID using DHCP. DHCP auto discovers the VLAN ID. No further steps are required to configure 802.1Q on the Internet Telephone. If this is selected, proceed to step 7 to continue the Internet Telephone configuration.

If **1-Ma** is selected, then the following VLAN ID displays:

Manual Cfg

VLAN: 1234

Note: The VLAN ID is entered as a decimal number. The VLAN ID is a 12-bit value between 0 and 4095.

- 6 Enter a valid value and press **OK**.

The Internet Telephone is configured with 802.1Q enabled, priority = 6, and the VLAN ID set to the entered value.

The i2004 Internet Telephone searches for the connect server. When the connection is complete, proceed to step 7.

- 7 Enter the following information provided by your System Administrator.

Screen prompt	Description
Password	Internet Telephone Installer Password You are not prompted to enter the Internet Telephone Installer Password if it has not been configured in your system.
Node	The node ID.
TN	The TN or VTN.

The i2004 Internet Telephone registers with the TPS and if needed, will begin the firmware download. This takes several minutes. When complete, the i2004 Internet Telephone resets.

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 8 Check for dial tone and the correct DN above the display.
- 9 Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 10 (Optional) Customize the Feature Keys as required. For more information, see "Configure programmable line (DN)/feature key labels" on page 117.

End of Procedure

i2004 Internet Telephone power cycle description

The power cycle is similar to the initial installation. The i2004 Internet Telephone saves its firmware, IP parameters, Node Number, and TN in memory. As the i2004 Internet Telephone proceeds through a start-up sequence it does not need to:

- re-enter the IP parameters if they were manually entered
- reacquire firmware or prompt the user for Node Number and TN

When the power is down on the i2004 Internet Telephone, LAN access is not available for the PC or other data devices connected to the Internet Telephone. Access is restored when power is restored to the i2004 Internet Telephone.

Reinstalling an i2004 Internet Telephone

You can reinstall an existing, previously-configured i2004 Internet Telephone on the same system. For example, the i2004 Internet Telephone can be assigned to a new user (new TN) or to an existing user who moved to a new subnet by changing the TN of the telephone.

Procedure 10

Changing the TN of an existing i2004 Internet Telephone

- 1 Repower the i2004 Internet Telephone.
- 2 If node password is not enabled:
 - a. Press **OK** when the node number displays.
A TN screen displays.
 - b. Activate the **Clear** soft key to clear the existing TN.
A new parameters prompt displays.

Note: During the reboot sequence of a previously configured telephone, the i2004 Internet Telephone displays the existing node number for approximately 5 seconds.

- 3 If node password is enabled and is not NULL:
 - a. Press **OK** when node number displays.
A password screen displays.

- b.** Enter correct password, and press **OK**.
A TN screen displays.
- c.** Activate the Clear soft key to clear the existing TN.

A new parameters prompt displays.

Note: During the reboot sequence of a previously configured set, the i2004 displays the existing node number for approximately 5 seconds.

- 4** If node password is enabled and is NULL, choose one of the following:
 - a.** Disable password and complete step 2.
 - b.** Set password as non-NULL and complete step 3 above.

End of Procedure

Replacing an i2004 Internet Telephone

IMPORTANT!

Two telephones cannot share the same TN. You must remove the i2004 Internet Telephone that is currently using the TN.

Procedure 11

Replacing an i2004 Internet Telephone

- 1 Disconnect the i2004 Internet Telephone that you want to replace.
Two telephones cannot share the same TN.
- 2 Follow either Procedure 8 on page 53 (static IP assignment) or Procedure 9 on page 57 (dynamic IP assignment) to install and configure the i2004 Internet Telephone.
- 3 Enter the same TN and Node Number as the i2004 Internet Telephone you replaced. The system associates the new i2004 Internet Telephone with the existing TN.

End of Procedure

Removing an i2004 Internet Telephone from service

Procedure 12

Removing an i2004 Internet Telephone from service

- 1 Disconnect the i2004 Internet Telephone from the network or turn the power off.

Note: The service to the PC is disconnected as well if the PC is connected to the Internet Telephone.

If the i2004 Internet Telephone was automatically configured, the DHCP lease expires and the IP address returns to the available pool.

- 2 In LD 11, OUT the TN.

End of Procedure

i2050 Software Phone

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Reference list

The following are the references for this section:

- *IP Line: Description, Installation and Operation* (553-3001-204)
- *Software Input/Output: Administration* (553-3001-311)

i2050 Software Phone description

The i2050 Software Phone is a Windows-based application that enables voice to make your computer a powerful tool. The i2050 Software Phone provides most of the attributes and features of the i2004 Internet Telephone.

The i2050 Software Phone operates on PCs running Windows 98, Windows 98 SE, Windows 2000 Professional, Windows XP Pro, and Windows XP Home.

The i2050 Software Phone supports the following attributes:

- Traditional telephony features such as Call Origination, Call Termination, Conference, Transfer, Hold, and Message Waiting Indication.
- Dedicated Hold, Release, Answer, Volume, Mute, Navigation and Message Waiting Indication keys.
- Macro functions for programming lengthy dialing patterns.
- Powerful directory capabilities: locally stored on the PC or linked to external directories such as LDAP, Microsoft Outlook, and ACT! contact management software.
- Network access and DHCP configurable services (automatic configuration of call server location using DHCP).
- Nortel Networks Universal Serial Bus (USB) Headset Kit for the speech path.
- User-selectable ringer that allows the PC speakers or the headset to ring for incoming calls.
- Reduced number of wires to the desktop by eliminating the need for telephony wires.
- Online help with full index search capabilities.

i2050 Software Phone system components

The i2050 Software Phone requires the installation of an Voice Gateway Media Card installed on your system. The i2050 Software Phone is comprised of an external Universal Serial Bus headset adapter (USB Headset Kit) and a software application installed on the PC of the user.

i2050 Software Phone components list

Table 8 lists the i2050 Software Phone package components.

Table 8
i2050 Software Phone package components

Component	Code
i2050 Software Phone application software CD	NTD83AA
USB Headset Kit	NTEX14AA

Voice Gateway Media Card

The Voice Gateway Media Card application supports the i2050 Software Phone by providing a communication gateway between the IP data network and the Meridian 1 or Succession CSE 1000. Installation of the Voice Gateway Media Card on your system is required to use the i2050 Software Phone.

For more information on the IT Line application, refer to *IP Line: Description, Installation and Operation* (553-3001-204).

USB Headset Kit

The USB Headset Kit provides a controlled high-quality audio environment, including:

- Absolute and predictable loss and level plan implementation that is necessary to meet TIA-810, FCC part 68 and its international equivalents, as well as the ADA requirements for the hearing impaired.

- Compliance with version 1.1 of the USB Device Specification and Windows Plug & Play specifications.
- Simple installation using standard Windows drivers (requires no additional software or drivers).
- Support on Windows 98, Windows 98SE, Windows 2000 Professional, Windows XP Pro, and Windows XP Home.
- In-use lamp connector with in-use control provided by polarity insensitive isolated contact closure.

The USB Headset Kit auto-configures in the supported Windows operating system. No specific software is supplied with it or is required.

i2050 Software Phone application

The i2050 Software Phone is a Voice over IP (VoIP) application that enables users to communicate over a LAN and WAN from their PCs. It combines the Meridian 1 or Succession CSE 1000 Server with PC resident directory capabilities.

The application is comprised of the following components:

- a Configuration Utility — used to configure the software phone
- the i2050 Software Phone — the software phone user interface
- Nortel Networks i2050 QoS Service

The i2050 Software Phone has the following functionality:

- Support for 802.1 Q, and DiffServ (operating system dependant)
- Automatic configuration of call server location using Dynamic Host Configuration Protocol (DHCP)
- Features and services are provided by the network (such as call features, calling line identification, and voice mail)
- Intuitive and flexible interface including:
 - slide-out trays to provide access to frequently used features and services

- retracted trays to provide a smaller interface with full operational capabilities for a single line
- viewable line status
- ten-item lists for quick dial access from both the main and system tray interface
- user-customizable interface and directories
- multilingual capabilities (English, French, or other local language)
- programmable macro functions for lengthy dialing patterns
- hotkeys map the computer keyboard to application buttons
- Windows system tray operation that allows the user to receive and place calls without interrupting other work
- Online help
- User-selectable ringing device to alert the user to incoming calls through the speakers when the headset is not being worn
- Support for G.711, G.729A, and G.729AB codecs for operation at a variety of network connection speeds

i2050 Software Phone Graphical User Interface

The Primary User Interface is shown in Figure 8 on page 72. This default presentation is with the operational trays retracted. In this mode the user can operate most features available from the i2050 Software Phone. Calls can be answered or made by pressing the green Answer button. In this mode the call server selects the line to answer or engage. The user can also hang-up, hold, retrieve from hold, mute, adjust volume and access network services such as voice mail. Within the Primary User Interface the computer keyboard provides hotkeys (in parentheses) for:

- answer (Enter)
- release (F12)
- hold (F5)
- soft keys/interactive keys (F1-F4)
- alphabetic keys map to numbers as per dial-pad mapping shown in Figure 11 on page 76
- arrow keys map to navigation keys
- \ key that maps to the # key
- CTRL-v that pastes information from the Windows buffer

Graphical User Interface components

Application menu

Click the Application menu icon (top left-hand corner) to open the Configuration Utility and configure the i2050 Software Phone.

Message lamp

The Message lamp turns ON to indicate that there is a message waiting. This lamp flashes when there is an incoming call.

Soft keys

Four additional soft-labeled keys on the i2050 Software Phone support a specific subset of the system key features.

Programmable line DN/Feature keys

Six programmable line (DN)/feature keys on the i2050 Software Phone support up to 12 DNs or features (by using the Shift key feature). These are displayed only on the Combo and Lines Tray displays.

Information display area

The information display area can contain four lines of text, up to a maximum of 24 characters for each line. The display area consists of two areas: Info line and Info window.

Info line

The Info Line is the first (top) line of display text. The left ten-character area shows **Meridian** or **Succession** as the call server type. The right part of the Info Line shows the current time and date.

Info window

The Info Window display is a 3x24 LED display area that shows prompts and information about calls. During a call the information area is used to display dialed digits, calling line ID, called party name, application-specific information, and various messages such as "Release and Try Again".

When the information exceeds 3x24 characters, a scroll icon indicates to the user to use the scroll keys to view the second line of the display.

Soft key label display

The i2050 Software Phone display has a character line that displays the label on the soft key. Each label is six characters. If the icon is off, the label contains seven characters.

Navigation keys

If the DOWN navigation key is green, then the UP and DOWN navigation keys are operational for scrolling the text line of the display. Otherwise, the UP, DOWN, RIGHT, and LEFT navigation keys are used for other various functions depending on the active application.

Answer key

Press the ANSWER key to answer or make a call. The ANSWER key is similar to lifting the handset on a telephone. Press the DN key in the Lines or Combo trays to answer or initiate a call.

Keypad dialing keys

The numeric keypad mimics a regular telephone's dialpad. It appears in the Number Pad Tray and Combo Tray displays.

Release key

Press the RELEASE key to terminate an active call. Use the RELEASE key for disconnecting the headset calls. The RELEASE key is only applicable to active calls.

Hold key

Press the HOLD key to place an active call on hold. The feature key label for the held line displays a flashing icon to indicate the call hold status. Press the DN key that corresponds to the line on hold to return to the call.

Mute key and indicator

During a call, press the MUTE key to mute the headset's microphone (transmit path). When the transmit audio is muted, the mute indicator flashes. To turn off muting, press the MUTE key a second time.

Network Directory key

Press the DIRECTORY key to access directory options. The DIRECTORY key is a fixed feature key.

Message or Inbox

Press the MESSAGE key to access voice messages. The MESSAGE key is a fixed feature key.

Shift key

Press the SHIFT key to shift between two feature key pages when a second feature key page exists.

Services key

Press the SERVICES key to connect to applications (services) located on a server. In this release, use the SERVICES key to gain access to the option menu items, such as language selection or date format.

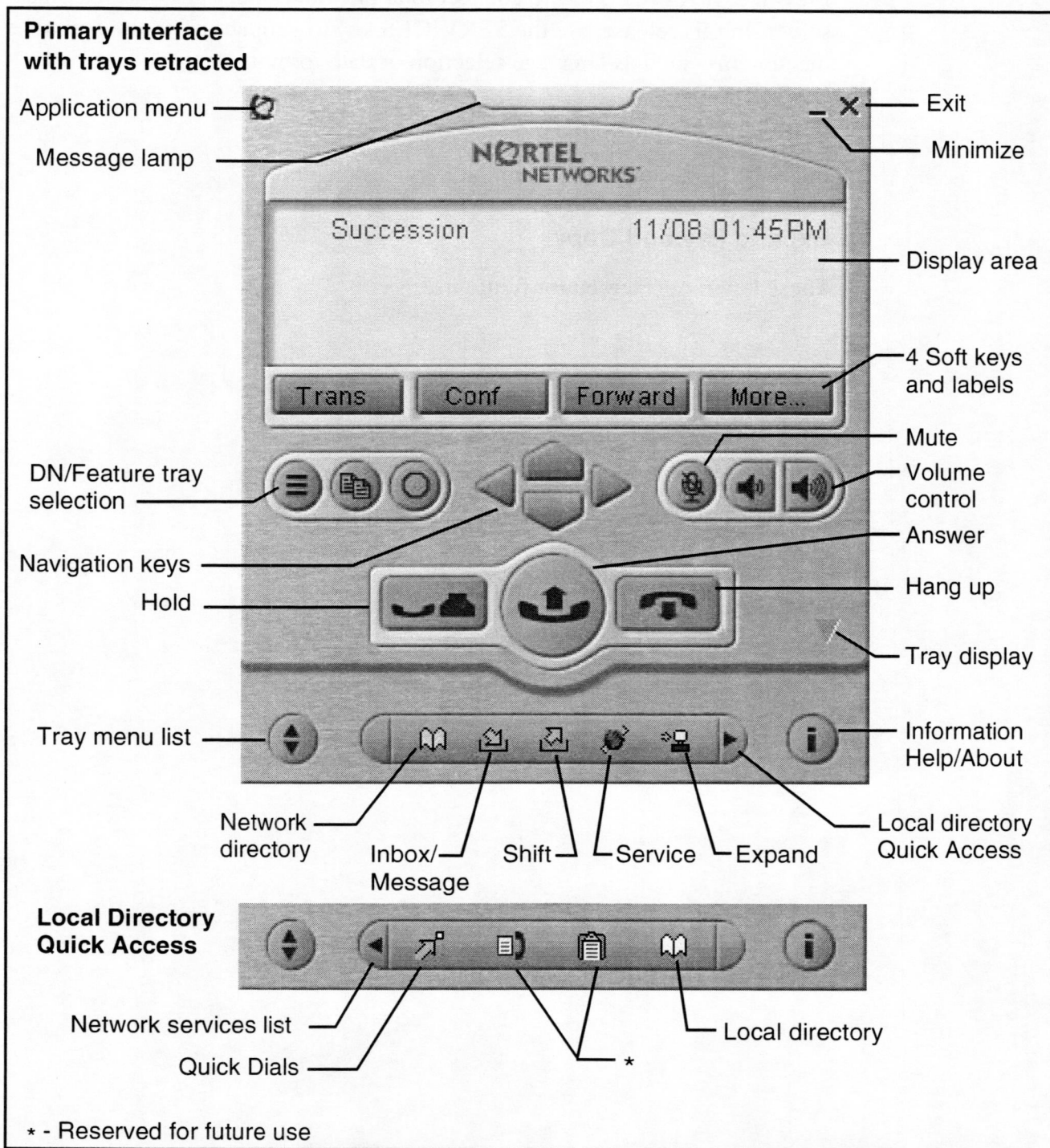
Quit

Press the Quit key to quit from the Services menu.

Expand key and Copy

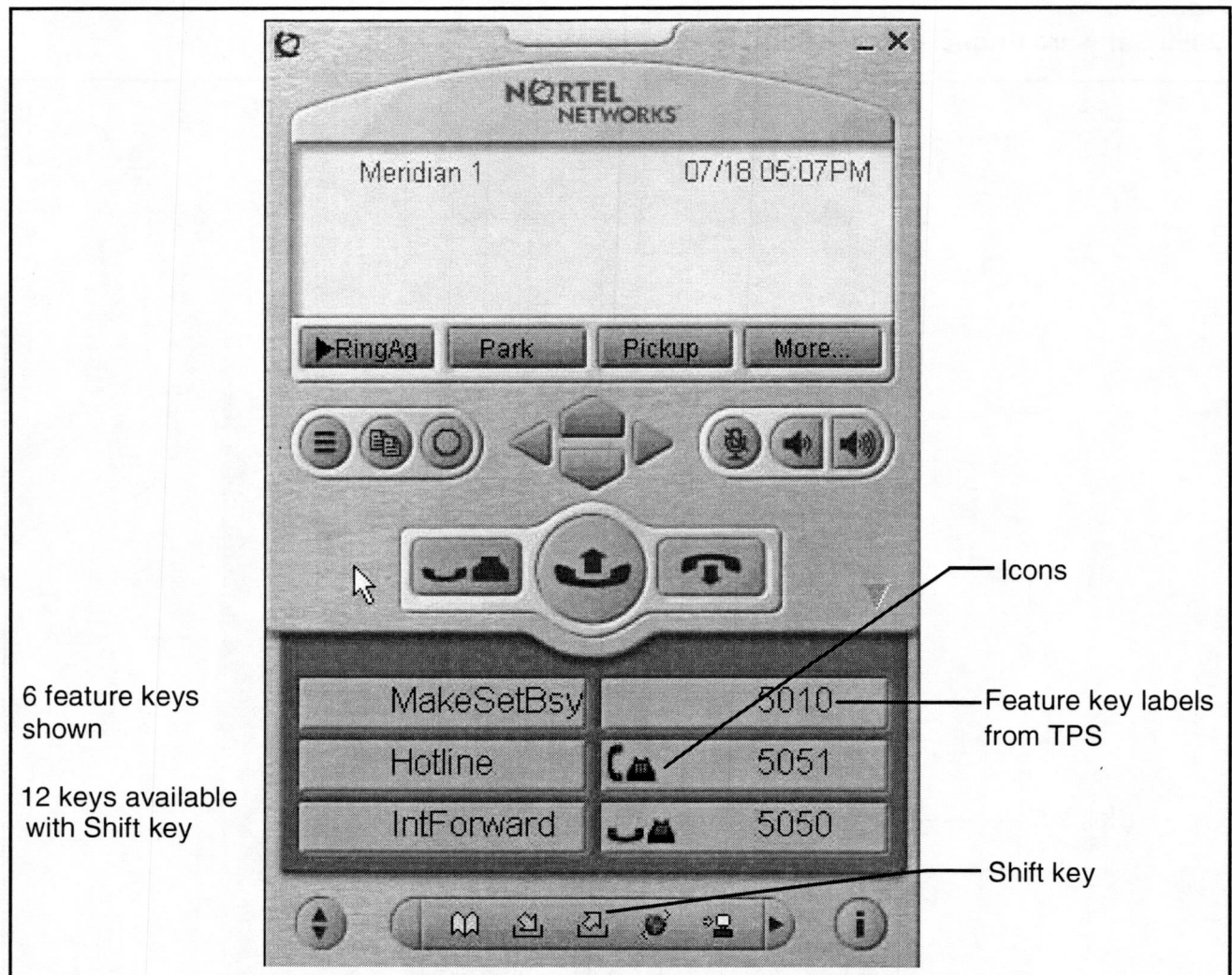
These keys are reserved for future use.

Figure 8
i2050 Software Phone Primary User Interface



The DN/Feature Key Tray shown in Figure 9 displays up to six DN or feature keys provisioned for the telephone by the call server. The status of each key is illustrated by text or a graphic icon, such as idle, ringing, or connected. The keys are labeled by the Terminal Proxy Server (TPS).

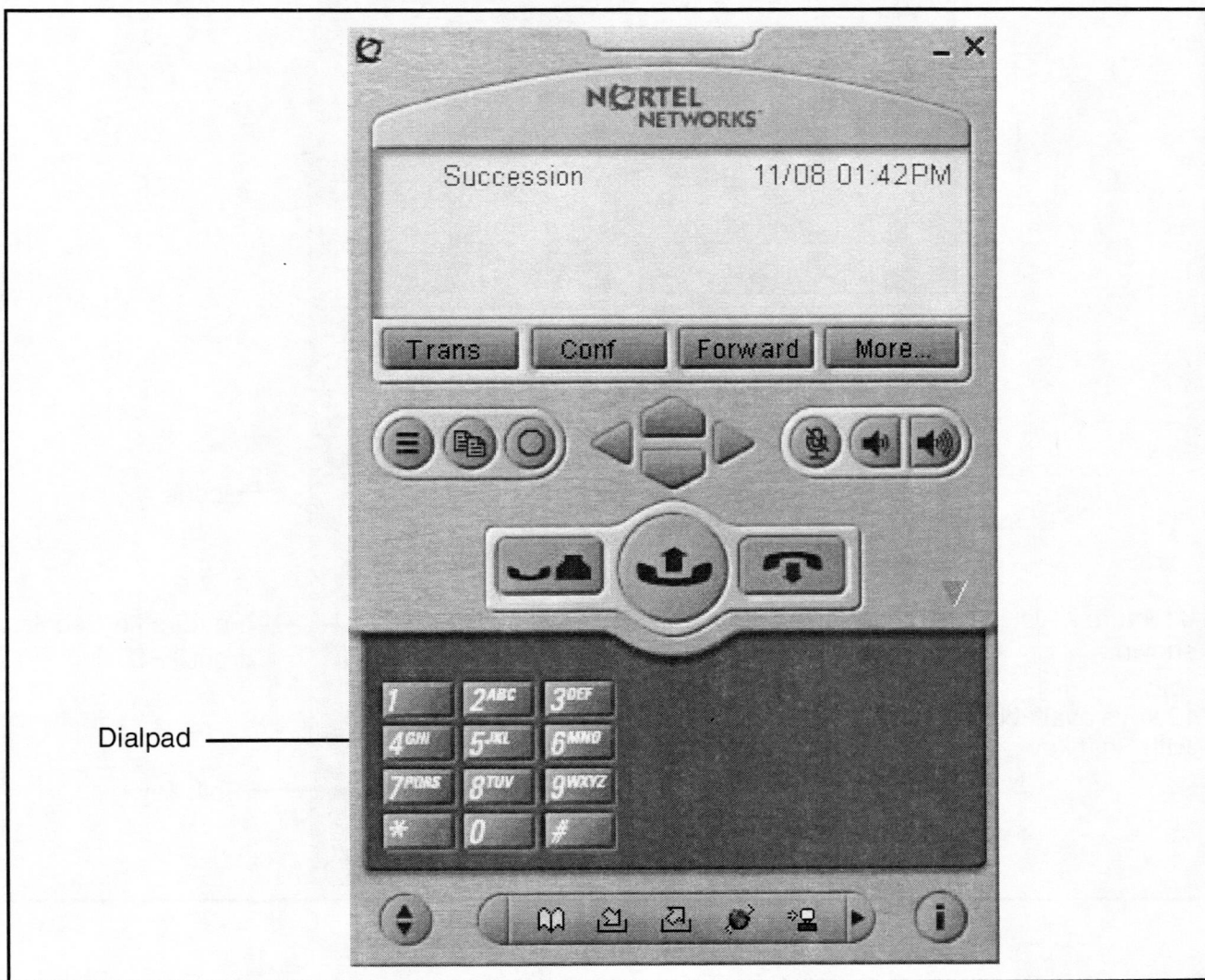
Figure 9
i2050 Software Phone DN/Feature Key Tray



The Number Pad Tray (shown in Figure 10) provides a graphic keypad to use with a mouse for dialing numbers. In all tray selections, you can also use the computer keyboard to dial numbers (use \ key for the # key).

Note: The numeric lock (Num Lock) feature on your keyboard must be turned on to click the numbers on the i2050 Number Pad Tray.

Figure 10
i2050 Software Phone Number Pad Tray



The Combo Tray shown in Figure 11 on page 76 combines the DN/Feature Key Tray and the Number Pad tray. The feature keys indicate the following states:

- Idle: as shown in Figure 11 on page 76.
- Ringing: long flashing red bar on the upper left corner of the key (see Figure 12 on page 77).
- Hold: medium winking yellow bar (see Figure 13 on page 78).
- Off-hook (Dialing/Answer): short solid green bar (see Figure 14 on page 79).

Figure 11
i2050 Software Phone Combo Tray

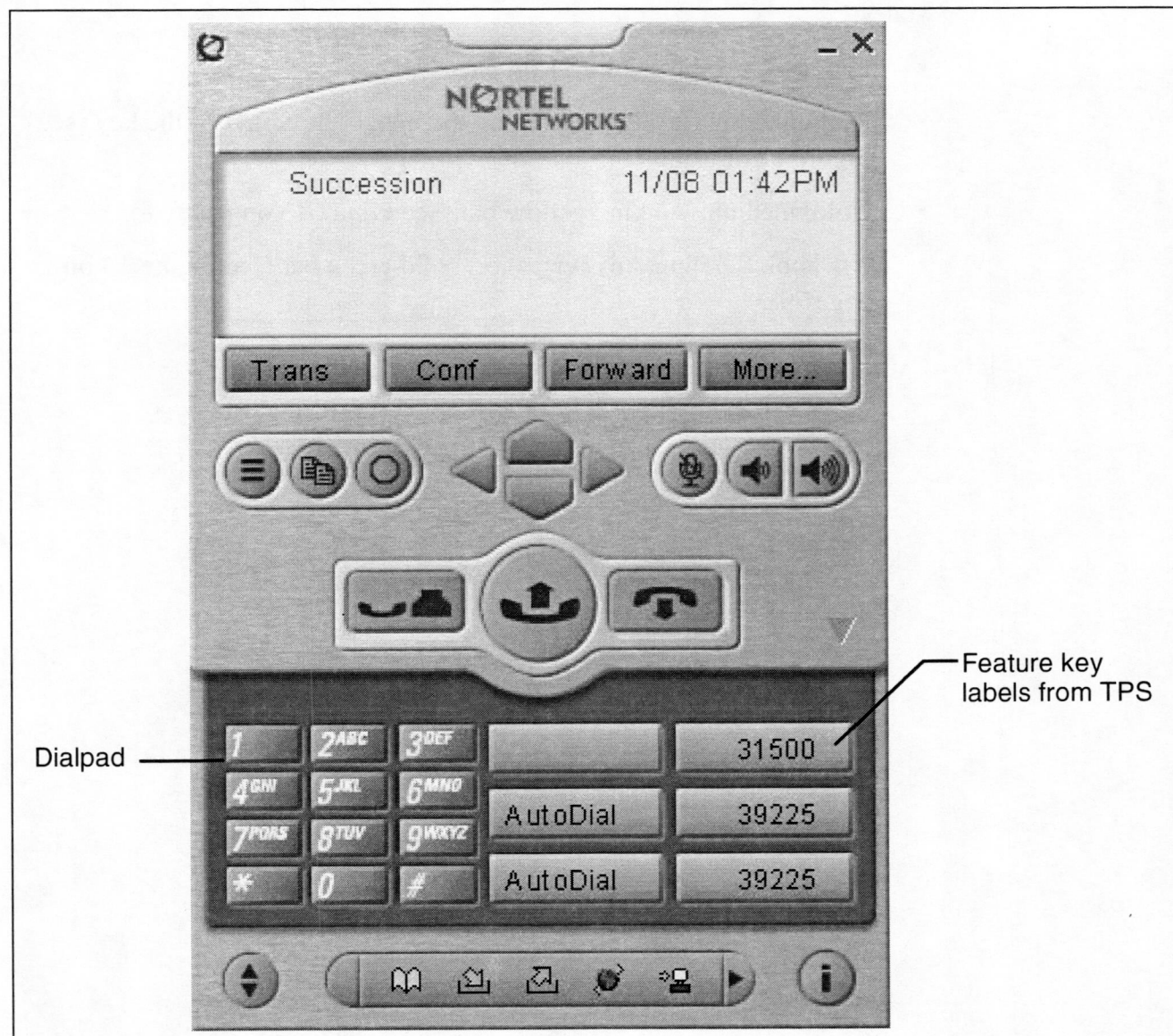


Figure 12
Feature Key indicating ringing with flashing red bar



Figure 13
Feature Key indicating hold with flashing yellow bar

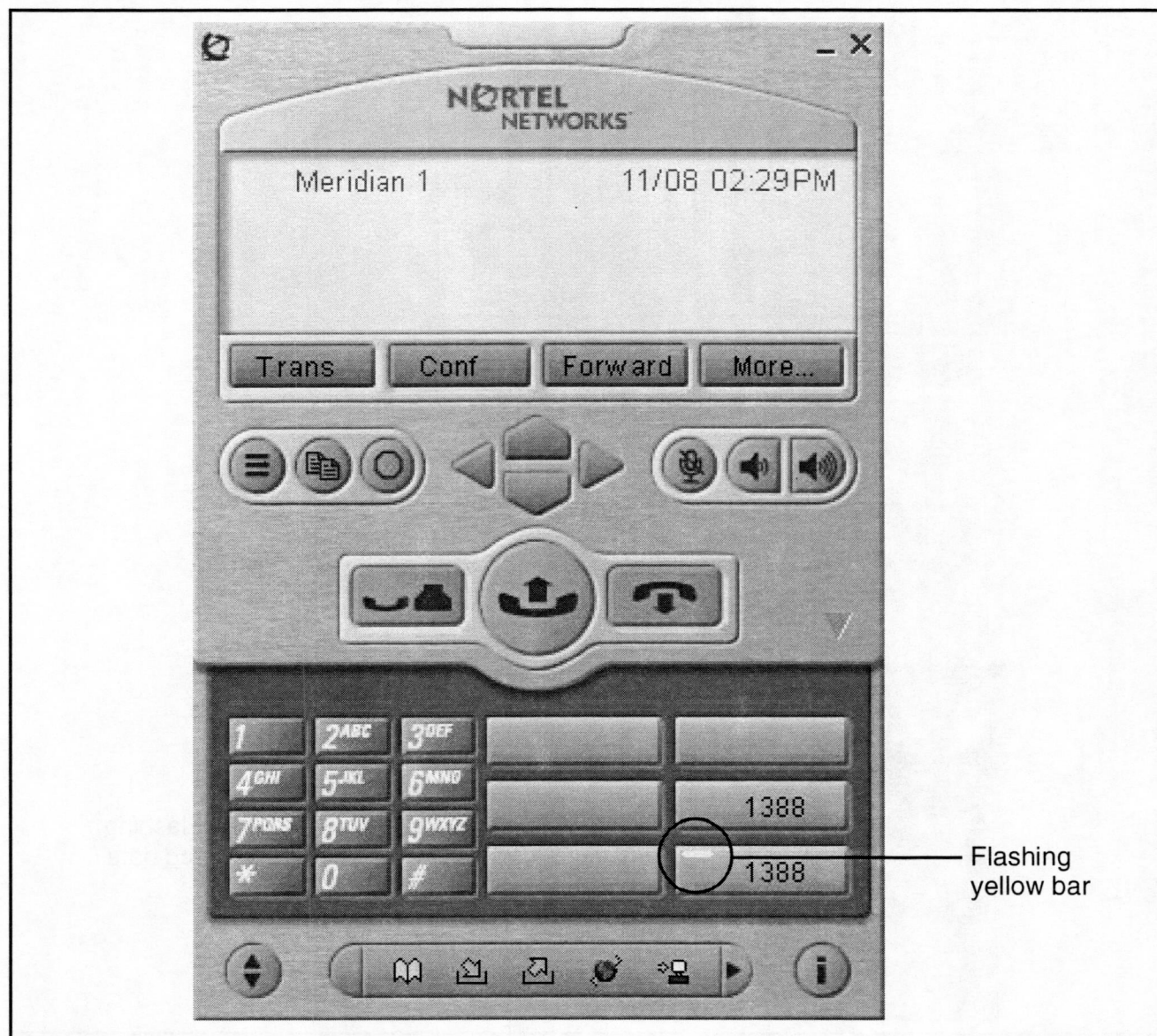
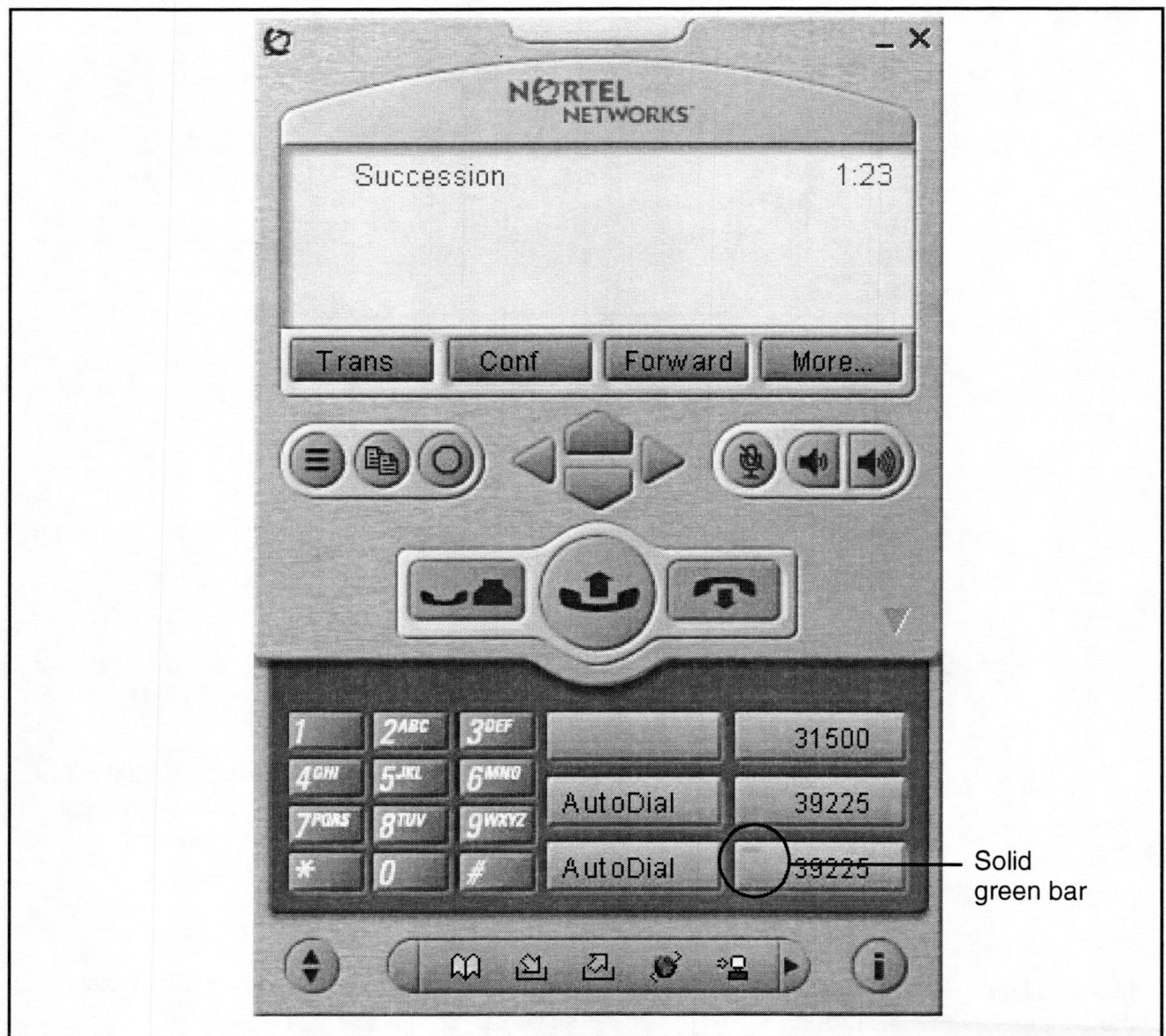
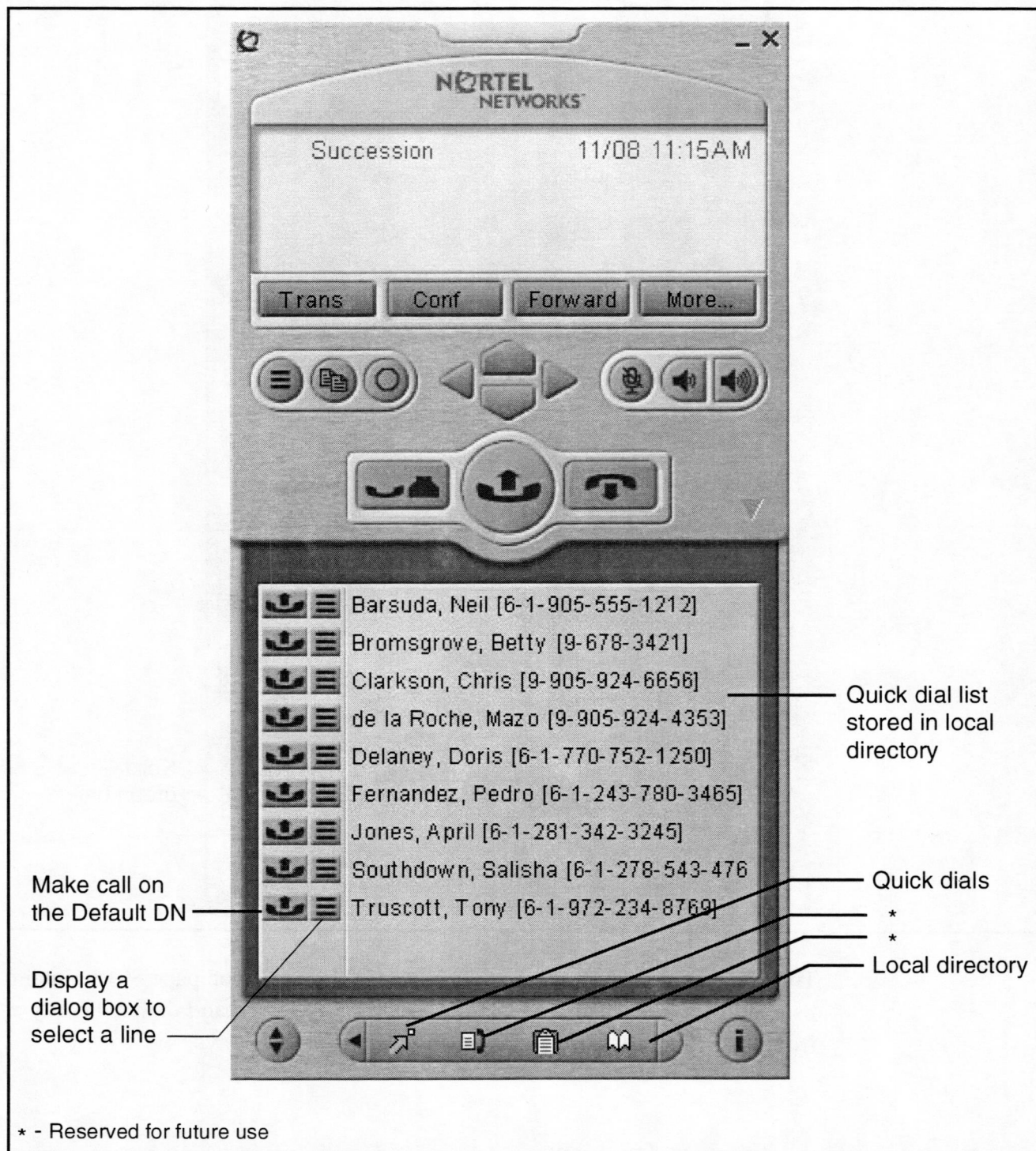


Figure 14
Feature Key indicating Off-hook (Dialing/Answer) with solid green bar



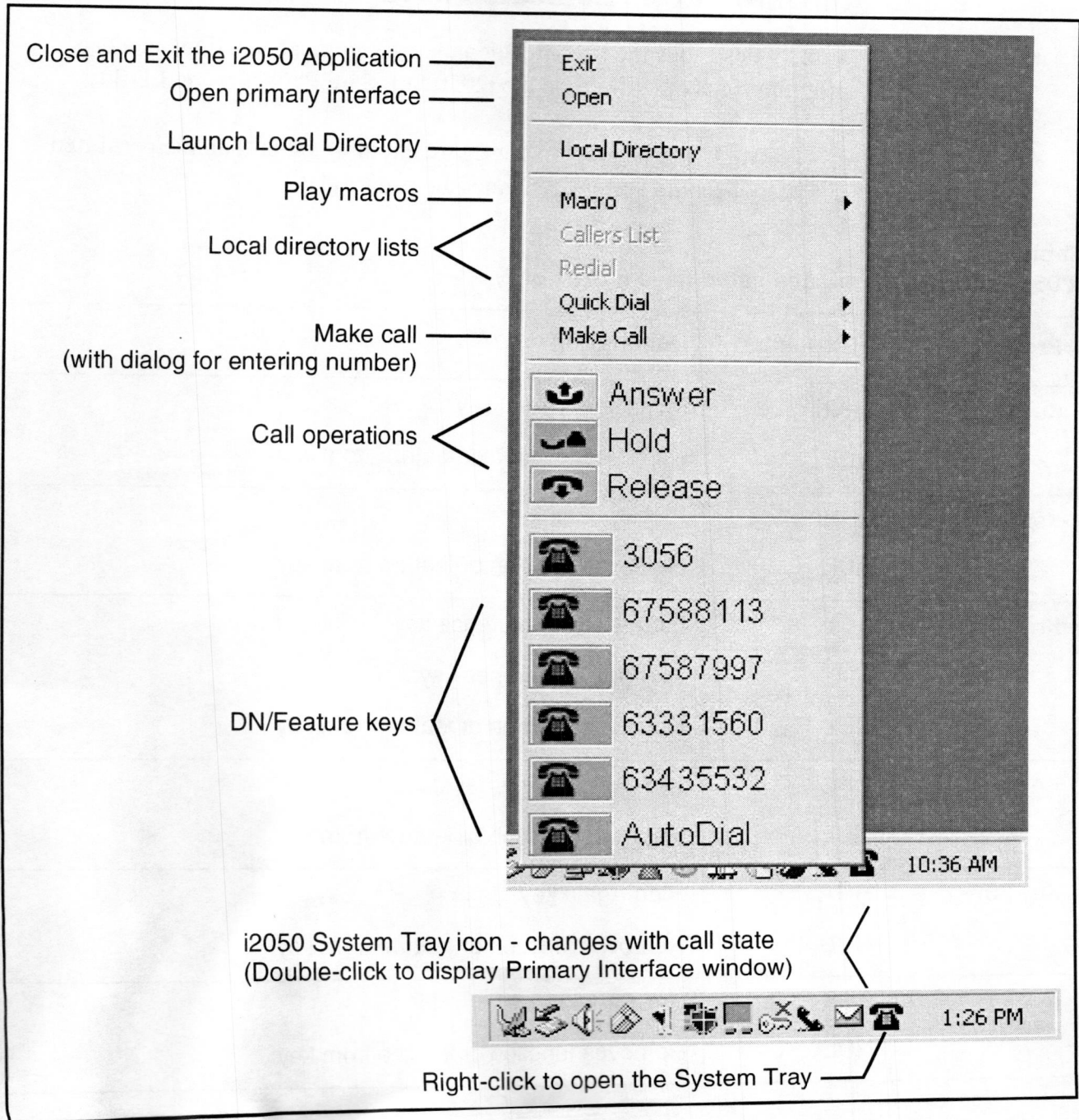
The Local Directory Quick Access Trays (see Figure 15 on page 80) maintain lists of quick dials. Ten items in the lists can be viewed and dialed directly from the Primary User Interface using Quick Access Trays.

Figure 15
i2050 Software Phone Local Directory Quick Access Tray



The System Tray (see Figure 16) provides fast access to most of the application's functionality. The user can answer a call from the System Tray without launching the Primary User Interface.

Figure 16
i2050 Software Phone System Tray



The System Tray Interface displays the current six DN/Feature keys. These keys are visible on the application's DN/Feature Key Tray or Combo Tray if the application is on the desktop. The Make Call menu item also displays the current six DN/Feature keys.

i2050 Software Phone dedicated keys

Table 9 describes the specific telephone assignment functions you can program for Keys 16–26 on the i2050 Software Phones using LD 11.

Note: If you attempt to configure anything other than the permitted response, the system generates an error code.

Table 9
i2050 Software Phone dedicated keys (Part 1 of 2)

Prompt	Response	Description
Key 16	MWK	Message Waiting key
	NUL	Removes function or feature from key
Key 17	TRN	Call Transfer key
	NUL	Removes function or feature from key
Key 18	A03	three-party conference key
	A06	six-party conference key
	NUL	Removes function or feature from key
Key 19	CFW	Call Forward key
	NUL	Removes function or feature from key
Key 20	RGA	Ring Again key
	NUL	Removes function or feature from key
Key 21	PRK	Call Park key
	NUL	Removes function or feature from key

Table 9
i2050 Software Phone dedicated keys (Part 2 of 2)

Prompt	Response	Description
Key 22	RNP	Ringing Number pickup key
	NUL	Removes function or feature from key
Key 23	SCU	Speed Call User
	SSU	System Speed Call User
	SCC	Speed Call Controller
	SSC	System Speed Call Controller
	NUL	Removes function or feature from key
Key 24	PRS	Privacy Release key
	NUL	Removes function or feature from key
Key 25	CHG	Charge Account key
	NUL	Removes function or feature from key
Key 26	CPN	Calling Party Number key
	NUL	Removes function or feature from key

Key number assignments

The i2050 Software Phone has six keys that present 12 feature keys, with six on each feature key page. The keys are numbered 0–11. The Shift key is used to change between two feature pages, 0–5 and 6–11.

The Message key is numbered 16. If Message Waiting is not configured then key 16 must be NUL.

Key numbers between 17–31 are assigned to the four soft label keys immediately below the display area. The supported features are: A03, A06, CFW, CHG, CPN, PRK, PRS, RGA, RPN, SCU, SCC, SSU, SSC, and TRN.

Language support

The i2050 Software Phone is affected by the following three language controls:

- Operating system language
- i2050 Software Phone language selection — Sets the language displayed in the help screens and in the menus. Select the i2050 Software Phone language from the Application menu or during installation.
- TPS language selection — Sets the language in the display area. The language in the display areas is selected from the Services > Language... menu.

Note: In normal operation, the language chosen from the i2050 Software Phone's language setup matches the language chosen from the Services > Language... menu. Otherwise the soft key labels and feature prompts will appear in a different language than the help text and menu items on the i2050 Software Phone application. The user must ensure that the appropriate language is chosen. The languages supported are shown in Table 10.

Table 10
Language support (Part 1 of 2)

TPS supports (display)...	i2050 Software Phone supports...
English	English - US
French	French - Euro
Spanish	Spanish - Euro
Portuguese	Danish
Danish	Dutch
Dutch	German
German	Italian
Italian	Norwegian
Norwegian	Swedish

Table 10
Language support (Part 2 of 2)

TPS supports (display)...	i2050 Software Phone supports...
Swedish	English - UK
Finish	French - Canadian
Polish	Spanish - Latin American
Czech	
Hungarian	

Operating parameters

The operating parameters for the i2050 Software Phone are as follows:

- A Universal Serial Bus (USB) port is required on the PC if you are using the Nortel Networks Headset adaptor.
- The minimum recommended system hardware for the i2050 Software Phone application is a Pentium Pro 200 MHz with 64 MB RAM (Windows 98, Windows 98 SE) or 128 MB RAM (Windows 2000 Professional, Windows XP Pro, and XP Home).
- For i2050 Software Phones, the software version upgrade must be done manually by the technician at the PC. The Voice Gateway Media Card does not download any software to the i2050 Software Phone. The isetShow command on the Voice Gateway Media Card displays the current version of any registered i2050 Software Phones.
- The i2050 Software Phone does not have an ACD Supervisor headset jack. Agent walkaway is not supported.
- An i2050 Software Phone does not register against a TN configured for any other type of Internet Telephone.
- Soundcard audio is supported only for incoming call notification. Nortel Networks supports only the USB Headset Kit for the speech path.
- The i2050 Software Phone application does not currently support Japanese, Portuguese, or Chinese languages for the help screens and skin text. See "Language support" on page 84 for more information.

- The i2050 Software Phone is supported by Nortel Networks only when used on a PC running Windows 98, Windows 98SE, and Windows 2000 Professional. The minimum recommended system hardware is:
 - Pentium Pro 200 MHz with 64 MB RAM (Windows 98 and Windows 98 SE)
 - Pentium Pro 200 MHz with 128 MB RAM (Windows 2000 Professional, Windows XP Pro and Windows XP Home)
- Five menu options available on the i2004 Internet Telephone are not required on the i2050 Software Phone. The five options are:
 - Volume adjustment
 - Contrast adjustment
 - Display diagnostics
 - Key click
 - On-hook default path

Feature implementation

A Voice Gateway Media Card must be installed in the system to configure the i2050 Software Phone.

Procedure 13

Installing an i2050 Software Phone

- 1 Install the Voice Gateway Media Card. IT Line 2.2 or later must be running on the Voice Gateway Media Card.
- 2 Configure a virtual loop on the call server, using LD 97.
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3 Configure the i2050 Software Phone in LD 11 with TYPE I2050.
- 4 Install the USB Headset Kit.
- 5 Install the i2050 Software Phone.
- 6 Run the i2050 Configuration Utility.

Table 11

LD 11 — Configure the i2050 Software Phone (Part 1 of 2)

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	i2050	Type of data block.
TN:	c u	Terminal number.
DES:	x...x	ODAS telephone designator.
CUST:	xx	Customer number.
...		
ZONE:	0-255	Zone number.
FDN:	x...x	Flexible CFNA DN.

Table 11
LD 11 — Configure the i2050 Software Phone (Part 2 of 2)

Prompt	Response	Description
...		
CLS:	aaa	Class of service. HFA - Digital Telephone Handsfree Allowed is default for i2050 to enable the USB interface.

Feature operation

i2050 Software Phone Services menu

The Services features control user-specific operating parameters of the i2050 Software Phone. The i2050 Software Phone's Services menu consists of the following items:

- Language
- Ring Type
- Time and Date Format
- Call Timer
- Internet Telephone Information

Note: These items remain the same through installs and uninstalls.

To change any of the options:

- Click the Services key. The Telephone Options menu appears in the information area. The four soft keys are labeled with Select Cancel.
- Use the Up/Down navigation keys to scroll up or down the menu. When an option is highlighted, use the Select soft key to select it.
- When an option is selected, press the soft keys to change the settings for the option. To exit from the selected option and return to the Services menu, press the Cancel soft key.

- If a call is presented while the user is manipulating an option, the i2050 Software Phone rings and the DN key flashes. However, the screen display is not updated with Caller ID. The programming text is not disturbed.
- The user can originate a call using Autodial or Last Number Redial while manipulating the options. However, the display is not updated with dialed digits or the Caller ID and the dialpad is intercepted by the Services.
- While active in the Services menu, press the Quit key at any time to exit the application. Any settings that are not saved at that time are lost.

Language

To select the display language of the i2050 Software Phone, highlight the Language option from the Services menu and press the Select soft key. Select a language from the sub-list of supported languages that is displayed then press the Select soft key. When finished, press the Exit soft key to return to the Services menu. See “Language support” on page 84.

Time and date format

To change the time and date display format of the i2050 Software Phone, highlight the Time and Date Format option from the Services menu and press the Select soft key. A list of different format types displays. Highlight the format and press the Select soft key to change the format. When finished, press the Exit soft key to return to the Services menu and the changed format is saved. The displayed time and date is sent from the TPS to the i2050 Software Phone, and therefore can vary from the time set on the PC.

Note: Because of the geographic independence that an IP connection provides, it is possible that an i2050 is not in the same time zone as its host call server. The current time and date mechanism within the call server assumes that all of its peripheral devices are in the same time zone. The time displayed on the i2050 is always the time known by the internal clock of the system.

Call timer enable

The Call Timer option allows the user to control the automatic timing of an established call locally at the i2050 Software Phone. The call timer can be switched between Enable and Disable mode.

To enable or disable the call timer, select the Call Timer option from the Services menu and press the Select soft key. The current setting of the Call Timer displays. Press the Change soft key to toggle the mode. When finished, press the Cancel soft key to return to the Services menu and the selected mode is saved.

Ring type

To change the ringer tone of an i2050 Software Phone, highlight the Ring Type option from the Services menu and press the Select soft key.

Select a ring type from the sub-list displayed then press the Select soft key. Press the Play soft key to test the ring type. When finished, press the Cancel soft key to return to the main menu and the changed ring type is saved.

i2050 Software Phone information

This option item displays Internet Telephone information, including: telephone IP address, hardware ID of i2050, current firmware version, TN, Node ID, Node IP address, and the specific Voice Gateway Media Card that the i2050 Software Phone is registered on.

Mute key operation

Press the Mute key to change between muted and unmuted. When the i2050 Software Phone is muted:

- all audio input from the headset is muted
- the Mute key flashes
- the audio path for the transmit direction is turned off (the far end does not receive audio packets)

Open an audio stream to change the status of the LED. If a muted call is hung up, or if the conference or transfer button is pressed, the mute feature and LED automatically turns off.

Answer key operation

Press the Answer key to initiate or answer a call.

Pressing the Answer key connects the audio path to the USB headset. The headset can be controlled only by the Answer key or Feature keys and the local volume control. The headset cannot be controlled by any Call Server software features.

Volume Controls – Headset, Ringer

The volume can be controlled independently for the ringer and headset and the setting stored locally on the PC.

- Ringer mode – When the i2050 Software Phone is on hook and is idle or ringing, selecting the volume Up/Down buttons changes the volume of the ringer.
- Headset mode – When the i2050 Software Phone is in headset mode, selecting the volume Up/Down buttons changes the volume levels.

When the volume level is changed, a small bar graph with a label displayed indicates the volume level change.

Call Features

This section describes the call features that are available on the i2050 Software Phone and how they are activated. The i2050 Software Phone supports any combination of features and DN types up to a maximum of 12 assigned to the programmable keys plus the 10 predefined features assigned to the soft keys. See Table 12 on page 92.

Key labels are downloaded from the Call Server. Changes to the call server configuration are reflected immediately in the key label. DN keys are labeled with the DN number (without the ESN location code).

The message waiting lamp indicates a message. The lamp also indicates alerting. The Message Waiting Key (MWK) is configured on the Message application key and cannot be configured on any other key.

Soft label key features

The four soft-labeled programmable feature keys which appear physically on the i2050 Software Phone can be used to provide up to ten features. Table 12 shows the default soft key features layout.

Table 12
i2050 Default soft key features (Part 1 of 2)

Key Number	Default Feature	Comments
Key 17	TRN (transfer)	
Key 18	AO6 (6-party conference)	alternate: AO3 (three-party conference). Feature AO6 is the default feature for key number 18. You can manually re-configure key number 18 as AO3 instead of AO6 through LD 11.
Key 19	CFW (call forward)	
Key 20	RGA (ring again)	
Key 21	PRK (call park)	
Key 22	RNP (ringing number pickup)	

Table 12
i2050 Default soft key features (Part 2 of 2)

Key Number	Default Feature	Comments
Key 23	(reserved for speed dial)	configure speed call: SCU/SCC/SSU/SSC Key 23 has no default feature configuration. The speed dial features require custom data that is not available during the default configuration process. Key 23 can be manually configured as SCU, SCC, SSU or SSC (all speed dial features).
Key 24	PRS (privacy release)	
Key 25	CHG (charge account)	
Key 26	CPN (calling party number)	
Key 27–31	reserved	

If a feature requires a feature package that is not present for the Call Server installation, that feature does not appear within the default configuration for the i2050 Software Phone.

If one of the key 17–26 features depends on a Class of Service that is not present for the particular telephone, the feature does not appear in the configuration of the i2050 Software Phone.

You can remove any of the features provided on keys 17–26 by manually reconfiguring the key number as NUL using LD 11.

Appearance of ten soft label keys

Under feature-rich conditions, when all required packages and Class of Service are present, all ten features on keys 17-26 are provided on the i2050 Software Phone. Table 13 shows how the maximum configuration appears on the telephone as four layers. Layer 1 is visible when the telephone is idle. The user navigates through the circular stack by using the More... key.

Table 13
Soft label keys layout

Layer 1	Trans	Conf	Forward	More...
Layer 2	Ring Again	Park	Pickup	More...
Layer 3	SCU	PrivRls	Charge	More...
Layer 4	CParty			More...

Appearance of fewer than ten soft label keys

The typical Internet Telephone can have less than ten soft label feature keys because of restrictions such as feature restriction or the removal of a feature key. Here is one example:

Table 14
Typical soft label keys configuration

Layer 1	Trans	Conf	Forward	More...
Layer 2	SCU	PrivRls		More...

When fewer than four soft label feature keys are configured, they can appear as a single layer, with no More... key.

Table 15
Four or less soft label key features

Layer 1	Trans	Conf	Forward	SCU
---------	-------	------	---------	-----

Unused keys

Some keys are not used in the implementation of the i2050 Software Phone. Activating an unused key does not cause the telephone to respond or the Call Server to send any messages.

Soft labeling

When a DN key or Autodial is configured on an i2050 Software Phone, the default label shown on the telephone for that line appearance is the DN number or Autodial number.

When a call processing feature is configured on an i2050 Software Phone, the default label shown on the telephone is a predetermined string. Soft labels for programmable feature keys are shown at the bottom of the display and have a maximum length of seven characters. Soft labels for programmable DN or feature keys at the top of the i2050 Software Phone have a maximum length of 10 characters.

In this release, the i2050 Software Phone does not provide user-specified labeling of the soft keys since the text is sent from the TPS.

Registration

When you add an i2050 Software Phone to the network, the i2050 can, depending on the Configuration Tool settings, connect to a pre-defined IP address or can request an IP address from a DHCP server. The i2050 Software Phone then contacts the Connect Server that instructs the i2050 Software Phone to display a message on its display screen requesting the customer's node number and TN.

After the customer enters this information, the i2050 Software Phone contacts the Node Master which selects a TPS with sufficient capacity to register the i2050 Software Phone. The i2050 Software Phone contacts the chosen TPS, and if the i2050 Software Phone is valid, registers it with the system. The registration information is then saved to the i2050 Software Phone.

Loss Plan

The USB Headset Kit provides the i2050 Software Phone with a fixed loss plan compliant with the TIA-810A specification. If other headsets or audio devices are used, the loss plan is unknown and undefined. Nortel Networks supports the resolution of audio problems only for the USB Headset Kit.

Echo Cancellation

Echo can be generated electrically when there is an impedance mismatch, or generated acoustically by feedback from a speaker or ear piece to a microphone. Any echo that is ultimately returned to the Internet Telephone is more noticeable to the listener because of the additional delay introduced by the IP connection.

The Voice Gateway Media Card has echo cancellers included as part of its function that cancel echo generated on the TDM side of the gateway. When there is audio going through the Voice Gateway Media Card, the echo cancellers are enabled.

The i2050 Software Phone has no echo canceller, so a slight echo from acoustic coupling on the headset can occur in some call situations.

Internet Telephone Concentration

The Voice Gateway Media Card supports the same concentration of i2050 Software Phones as i2004 Internet Telephones; a mixture of these can exist on a Voice Gateway Media Card up to the current maximum of a total of 96 devices registered. The i2050 Software Phone uses the same UNISTim messaging for registration, call setup and teardown, and therefore imposes the same real-time impact on the Voice Gateway Media Card.

Clock Synchronization

Buffer underruns and overruns can occur since there is no sample clock at the receiving end of an IP audio stream synchronized to the transmitting clock. The buffer overruns and underruns are corrected by two mechanisms, both of which apply to the Internet Telephones and the DSPs on the Voice Gateway Media Card.

Jitter Buffer

The jitter buffer of the i2050 Software Phone is configurable. Set the jitter buffer in one of the following ways:

- Using the default value sent from the TPS (the value configured in OTM). It is recommended that the default value be used.
- Using the Configuration Utility.

The jitter buffer has a desired size and a maximum allowable size. If the jitter exceeds its maximum allowable size, sufficient frames are discarded to reduce the contents of the jitter buffer to the desired setting. If the jitter buffer underruns, frames are held in the jitter buffer until it fills to the desired level. Both under run and over run result in a discontinuity in the audio.

For codecs that support silence suppression, the jitter buffer is resynchronized at the beginning of each talk spurt.

QoS

A combination of codec selection, jitter buffer and packet time, and the use of the network's DiffServ code point all contribute to the end-to-end QoS.

However, the i2050 Software Phone is an application within the context of the PC's OS, such that the OS has an effect on how flexible is the support of the i2050 of these items. The DSP functionality (such as codec packetization) implemented in DSP hardware on the i2050 Software Phone and Voice Gateway Media Card runs as part of the application code on the PC's CPU. If the CPU is busy with other tasks, voice quality can be negatively affected.

The number of buffers used to buffer audio data between the application and PC audio hardware device driver is adjustable from the Configuration Tool (see “Select Sound Devices tab” on page 104). The fewer buffers used reduces the audio path delay but increases the chances of dropouts and choppy speech depending on the speed and utilization of the PC’s CPU.

DiffSERV (DSCP)

The i2050 Software Phone uses DSCP settings assigned by the TPS. The i2050 Software Phone supports DSCP on Windows 98, Windows 98 SE, and Windows 2000 Professional.

802.1Q

The i2050 Software Phone uses 802.1Q settings assigned by the TPS. The i2050 supports 802.1Q on Windows 2000 Professional. This requires the installation of Nortel Networks i2050 QoS Service. The DSCP values assigned from TPS 802.1Q operation can be enabled or disabled from the QoS tab in the Configuration Utility.

The service can be installed from the CD-ROM. If you install the i2050 Software Phone with Administrators access, then this service is installed automatically.

Codec

The i2050 Software Phone provides the following codecs:

- G.711 provides the highest quality (if the network facilities can handle the packet flow) since there is no compression.
- G.729A is ranked best; it has 8:1 compression but no voice activity detection.
- G.729AB is the same as G.729A but with voice activity detection enabled; while this provides the lowest average network bandwidth utilization, in some call environments the speech quality will suffer due to clipping of the beginning of words.

Frame size

The i2050 Software Phone supports the following range of frame sizes:

- G.711-64 A-law and μ law: 10-960 – 10 ms increments
- G.729A: 10-960 – 10 ms frames
- G.729AB: 10-960 – 10 ms frames

i2050 Software Phone Installation

The call server side of the configuration process is the same as the i2004 Internet Telephone:

- Install the Voice Gateway Media Card. The IT Line 2.2 application must be running on the Voice Gateway Media Card.
- Configure a virtual loop on the call server, using LD 97.
- Configure the i2050 Software Phone in LD 11 with TYPE I2050. See Table 11 on page 87.

The remainder of this section provides information about installing the USB Headset Kit and the i2050 Software Phone.

Installing the USB Headset Kit

If you install the USB Headset Kit before the i2050 Software Phone, then the USB Headset Kit displays as an audio device during the installation of the i2050 Software Phone.

If you install the USB Headset Kit after the i2050 Software Phone, then select the USB Headset Kit using the Configuration Utility. See “Select Sound Devices tab” on page 104.

Procedure 14
Installing the USB Headset Kit

- 1 Connect the coiled lower cord to the headset cord with the Quick Disconnect connector. Ensure the Quick Disconnect is securely fastened.
- 2 Connect the headset cord to the RJ9 jack on the adaptor.
- 3 Connect the USB cable to the headset adaptor and to one of the USB jacks on the back of your PC or USB hub.

End of Procedure

The first time the headset adapter is plugged in, there is a delay while Windows configures the device and locates appropriate driver software. During the installation you are prompted to supply the original Windows CD-ROM so that Windows can locate the required drivers.

Installing the i2050 Software Phone

Note: If you are upgrading your i2050 Software Phone software, record the information in the Configuration Utility's Server tab (see page 110) before you start the upgrade. This information is required for step 6.

Procedure 15
Installing the i2050 Software Phone on your PC

- 1 Insert the CD-ROM disk into the CD-ROM drive of your PC.
Note: Installation should proceed automatically. If it does not, then continue with step 2. Otherwise go to Step 5.
- 2 Double-click the My Computer icon.
- 3 Double-click the CD icon.
- 4 Double-click the Setup icon.
- 5 Follow the prompts.
- 6 Run the i2050 Configuration Utility (from the Windows Control Panel) to assign a server address, select sound devices, and select a server type.

- 7 Select *Start>Programs>Nortel Networks>i2050 Software Phone* to start the i2050 Software Phone application.

End of Procedure

Configuration Utility

Use the Configuration Utility to set the following types of configuration parameters:

- Communications server parameters
- Sound devices
- QoS
- server type

There are more advanced configuration settings available but they are not set as frequently including. These include: hardware ID, advanced audio, Listener IP, and trace. Changing the default settings in these tabs is usually not required.

See Procedure 15 on page 100.

Figure 17 shows the opening screen of the Configuration Utility.

Figure 17
Configuration utility

The screenshot shows a Windows-style dialog box titled "i2050 Software Phone Properties". It has a tabbed interface with the following tabs: Hardware ID, Advanced Audio, Listener IP, Trace, About, Communications Server, Select Sound Devices, QoS, and Server Type. The "Communications Server" tab is currently selected. Inside this tab, there are two radio buttons: "Obtain a server address automatically" (which is unselected) and "Use the following server address information:" (which is selected). Below the selected radio button, there are two groups of input fields. The first group is for "IP Address" and "Port". The "IP Address" field is a text box containing "192 . 0 . 0 . 1". The "Port" field is a dropdown menu showing "4100". The second group is for "Name", which is a text box that is currently empty. At the bottom of the dialog box, there are three buttons: "OK", "Cancel", and "Apply".

i2050 Software Phone Properties				
Hardware ID	Advanced Audio	Listener IP	Trace	About
Communications Server	Select Sound Devices	QoS	Server Type	
☐ Obtain a server address automatically ☒ Use the following server address information: ☒ IP Address: 192 . 0 . 0 . 1 Port: 4100 ☐ Name:				
OK Cancel Apply				

Communications Server tab

A summary of all the required parameters and the method of acquisition is given in Table 16. Information on how to set each of the parameters follows.

Table 16
IP telephone IP parameters

Parameter	Method of Acquisition
IP Address	Configured for the PC manually or retrieved using DHCP.
Net Mask	Configured for the PC manually or retrieved using DHCP.
Router Address	Configured for the PC manually or retrieved using DHCP.
Initial Server Address (Primary and Secondary)	Configured in the Communication Server tab of the Configuration Utility.
UserID (Node ID, Node Password and TN)	Manually entered for the first time configuration. Retrieved from storage for subsequent registrations.

The i2050 Software Phone uses the PC's IP address, net mask, and router address. When the i2050 Software Phone is launched and DHCP is enabled, it does a DHCP request on its own. It looks only for custom values such as the Server 1 address. The Nortel application-specific strings are entered into the DHCP tables as determined by the i2050 Software Phone values in the format defined for the specific DHCP server.

If the DHCP server is changed or rebooted, the general values (such as the PC's IP address) are refreshed only when the PC is rebooted - the DHCP server is responsible for tracking IP address leases. If the DHCP extended parameters (for example, Server 1 address) are modified, the i2050 Software Phone application must be restarted.

The Node ID and TN must always be manually entered at the i2050's screen during the first-time registration process. If a non-null password was configured for the node, the user must enter the password correctly before going to the TN-entering screen.

See Figure 17: "Configuration utility" on page 102. If your site uses DHCP to configure Internet Telephones, select "Obtain a server address automatically". This is the default method of locating the Communications Server. If DHCP is used, no further configuration is required. The application does its own DHCP request to retrieve the IT Line Node's IP address information.

If you choose to manually configure the Communications Server address, select "Use the following server address information" and enter the IT Line Node's IP address. In the Port box, select Meridian 1 or CSE1000 depending on your system type. This sets the Port to 4100. The IP address is provided by your System Administrator.

Select Sound Devices tab

This tab selects the PC's audio device for the microphone, speaker and alerting tones. See Figure 18 on page 105.

Select headset device for making calls

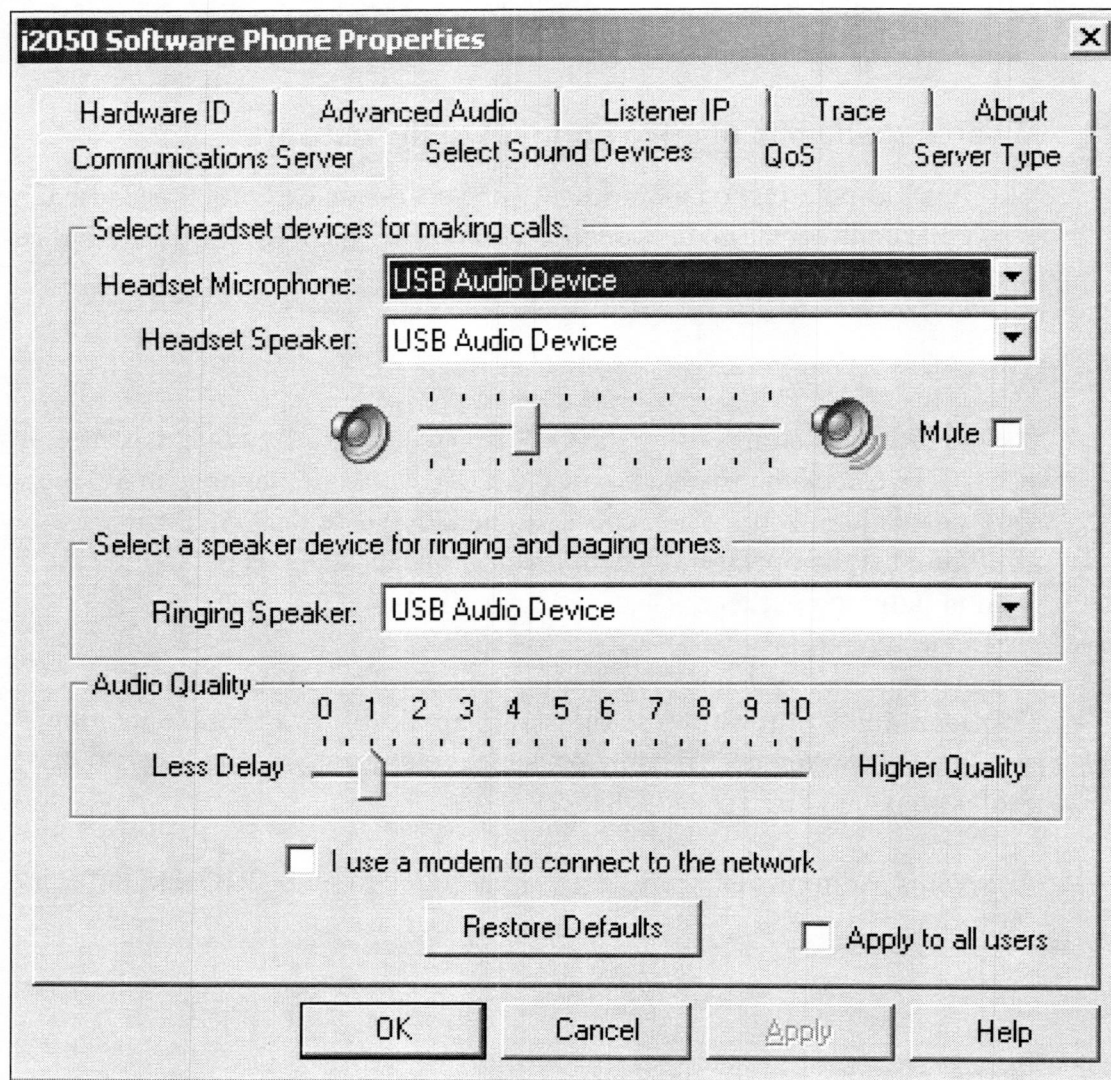
The drop-down menus contain audio devices that are recognized for the headset's microphone and speaker. Select the USB Audio Device to choose the Nortel Networks USB Headset.

Adjust the Windows volume setting on the PC using the slider bar. Select the Mute check box to mute the PC's volume. These controls apply to the device selected as the headset speaker. If the selected headset speaker device and the selected ringing device are the same, then the ringing device is also affected by these controls.

Select a speaker device for ringing and paging tones

You can select a different speaker as a ringing device. This allows call-alerting tones to be played over the PC speaker rather than on the headset, so that you can hear the ringing phone when you have taken the headset off.

Figure 18
Select Sound Devices tab



Audio Quality

This slider allows the user to choose the balance between low delay or higher quality audio. The slider adjusts the number of buffers between the PC's audio device and the i2050 application. Less delay is achieved by reducing the number of buffers; however, this increases chances the buffers can run out, resulting in poorer audio quality. The Less Delay setting requires the PC's CPU to give attention to the application more frequently and should be chosen only on newer PCs with fast CPUs.

Choosing Higher Quality increases the number of buffers, making buffer under-/overruns less likely, but increasing the end-to-end delay. If choppy or broken speech is heard, move the slider toward Higher Quality to see if that eliminates the problem.

When a modem is used to connect to the network

This box has no effect on a Meridian 1 or Succession CSE 1000 because the core CPU controls the codec selection and notifies the i2050 Software Phone which one to use.

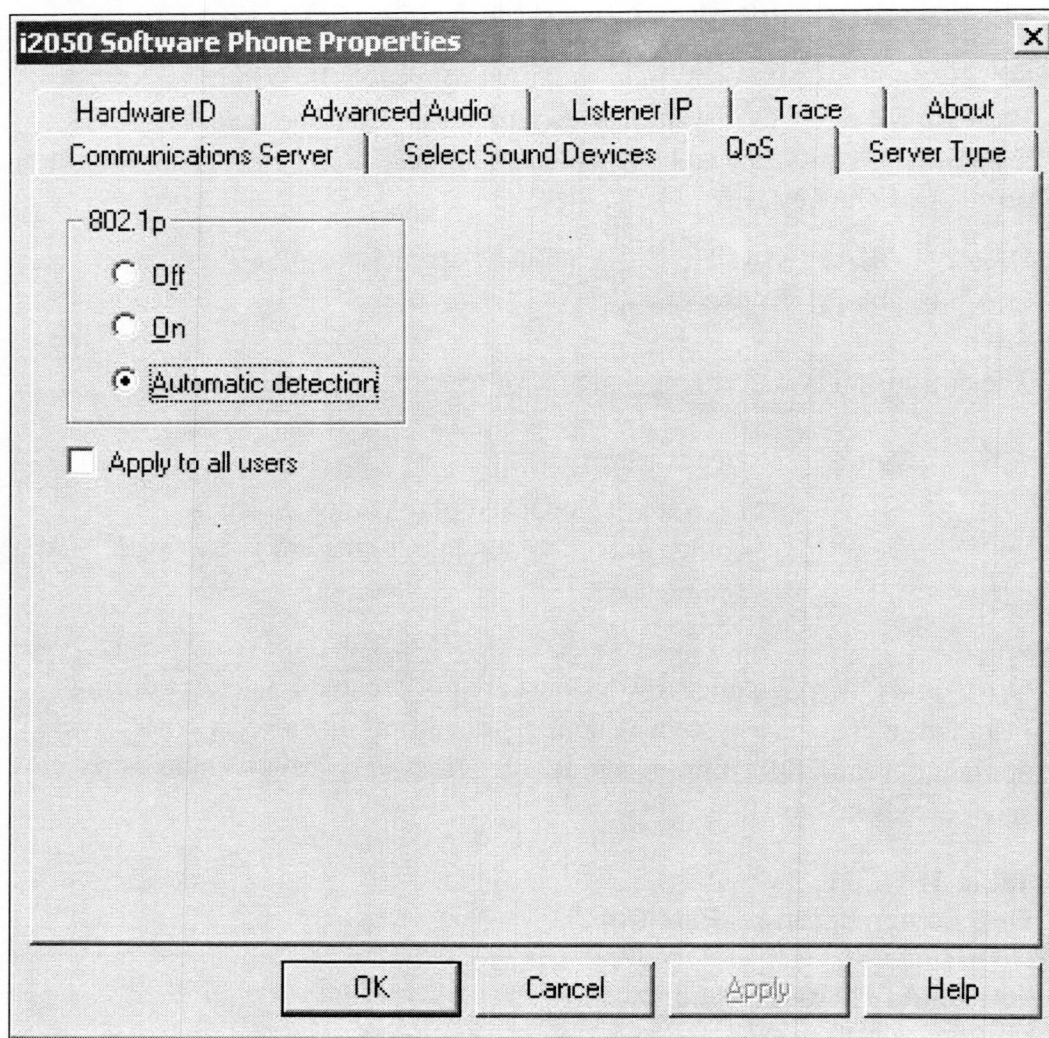
QoS tab

Assign the QoS settings using the QoS tab (see Figure 19: “QoS tab” on page 107). Check the Enable box if the i2050 Software Phone is in a QoS-enabled network. When checked, the i2050 uses the DSCP values configured at the operating system level. If unchecked, 0 is put in the DSCP field in outgoing packets.

Not all operating systems allow assignment of all QoS settings. The Configuration Utility allows settings only applicable to specific operating systems to be assigned. The only possible assignments in Windows 2000 Professional are 802.1Q and DiffServ.

Note: Administrator privileges are required to set 802.1Q and DiffServ.

Figure 19
QoS tab



Prerequisites for Windows 2000 Professional 802.1Q/DiffServ:

To enable QoS on Windows 2000 Professional, the administrator must install the QoS Packet Scheduler as follows:

- Open the Windows Network Properties and click on "Install...".
- In the "Select Network Component Type" dialog box, choose "Service" and click "Add...".
- In "Select Network Service" dialog box, choose "QoS Packet Scheduler" and click "OK".

Note: The Windows 2000 Professional CD-ROM may be required.

QoS registry settings assigned by the Configuration Utility

802.1Q and DiffServ on Windows 2000 Professional - Windows 2000 Professional requires a system-wide registry key setting to enable QoS capabilities. This value can be created and modified only with Administrator privileges. The key is:

HKEY_LOCAL_MACHINE/SYSTEM/CurrentControlSet/Services/
Qosp/EnablePriorityBoost

The entry is a DWORD value and its values are:

Value	Description
0	Do not enable QoS (default value which is equivalent to the absence of the key).
1	Enable QoS.

Qosp and Qosp/EnablePriorityBoost are not created by default during installation. This is a system-wide registry setting that affects other applications and OS components. It is in effect only if the Windows packet scheduler is installed.

Table 17
QoS screen settings (Part 1 of 2)

Attribute	Description
On	Select this option to turn 802.1q/p QoS on. When you select this option and the QoS Service is installed and running, the i2050 Software Phone adds 802.1q/p to the i2050 Software Phone packets. It assigns 802.1p as determined by the Communications Server definition (default 6).
Off	Select this option to turn 802.1q/p QoS off. When you select this option, the i2050 Software Phone does not add 802.1q/p to the i2050 Software Phone packets, regardless of whether or not the QoS Server is present.

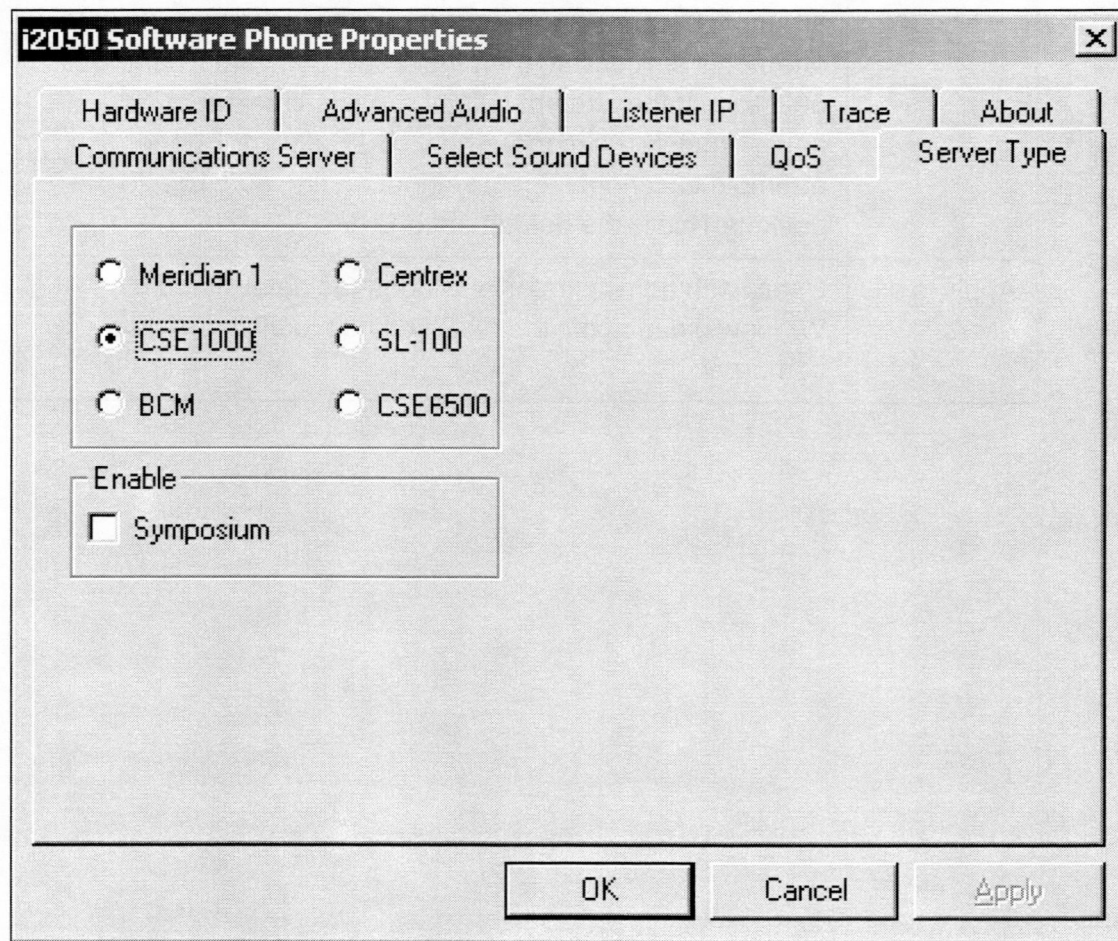
Table 17
QoS screen settings (Part 2 of 2)

Attribute	Description
Automatic detection	Select this option if you want the i2050 Software Phone to decide if 802.1q/p QoS is used. When you select this option, the i2050 Software Phone attempts to connect with 802.1q added to the packets. If the attempt is successful, then the i2050 Software Phone uses 802.1q/p. If the attempt fails (there is a time out approximately 1 second), the i2050 Software Phone attempts to connect again without adding 802.1q/p to the packets. This is the default option.
Apply to all users	Users with administrator privileges (as determined by Windows) can apply the QoS settings to all users on a computer.

Server Type tab

Select Meridian 1 or Succession CSE 1000 for the Server Type (see Figure 20). If the i2050 Software Phone is used in an ACD agent environment, check the Symposium box for ACD Hookswitch Enable.

Figure 20
Server Type tab



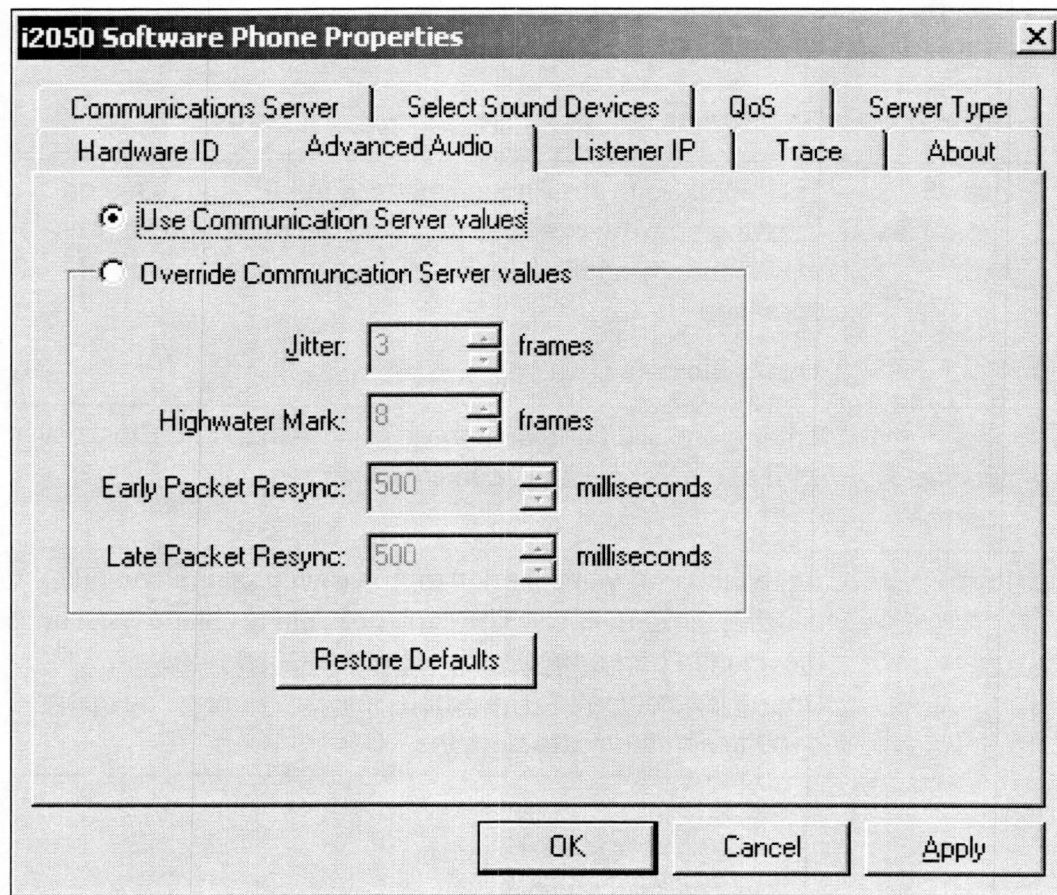
Hardware ID tab

The Hardware ID is sent to the TPS to uniquely identify an i2050 Software Phone. The MAC address for the PC NIC is a large part of the Hardware ID. The Hardware ID must not be changed.

Advanced Audio tab

Under normal circumstances, the radio button for “Use Communication Server values” should be selected (see Figure 21). This uses the jitter buffer parameters sent from the TPS. Select “Override Communication Server values” to set the jitter buffer. This is not recommended.

Figure 21
Advanced Audio Tab



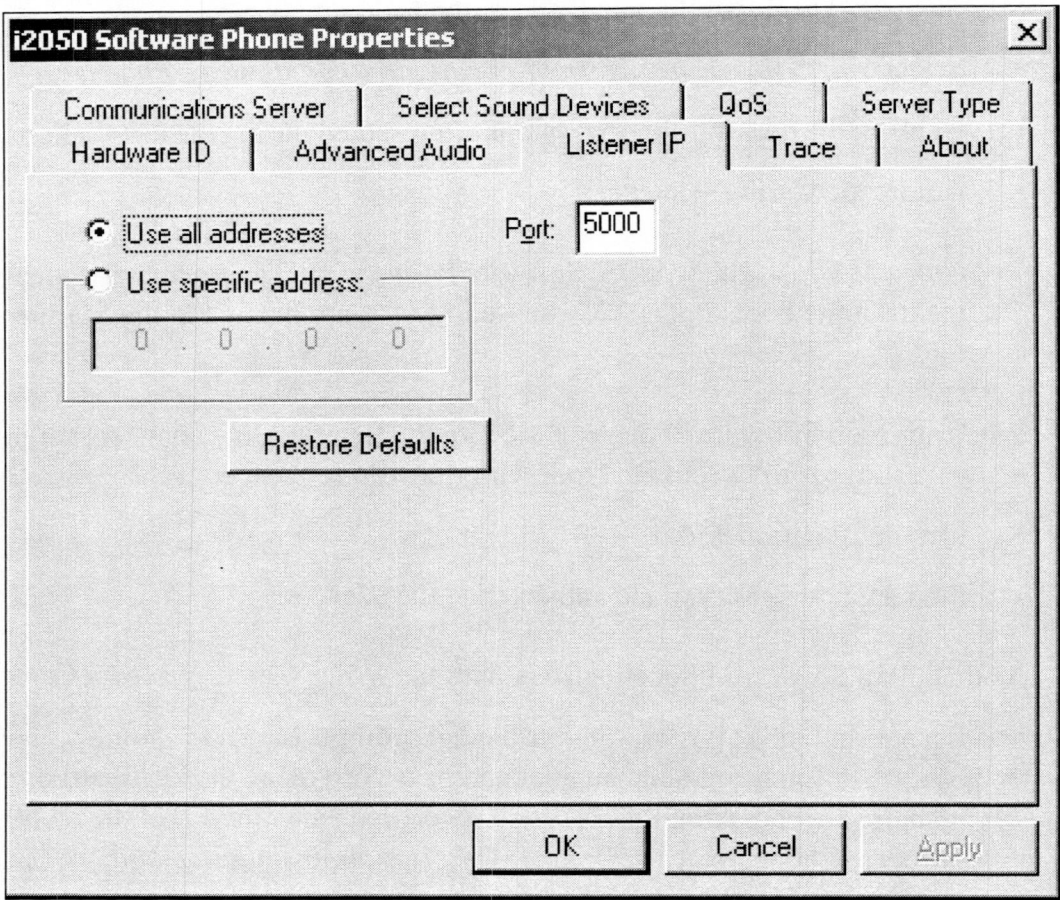
Listener IP tab

The Listener IP screen (see Figure 22 on page 113) is intended for expert users only. This screen identifies the IP addresses and ports where the i2050 Software Phone is listening for traffic from the Communications Server. You can use this screen to override the port assignments when there is a conflicting application on the computer. Table 18 describes the Listener IP attributes that can be configured.

Table 18
Listener IP screen settings

Attribute	Description
Use all addresses	The i2050 Software Phone listens to the IP addresses on all of the network interface cards on the PC for traffic from the Communications Server. This is the normal mode of operation. This is the default value.
Use specific address	Enter a specific address if there is more than one Ethernet card and an application conflict exists.
Port	Adjust the Port value if another application on the computer is using the same port. The two applications can co-exist by moving the port or IP address that the i2050 Software Phone is listening to. The i2050 Software Phone uses port 4100 to communicate from the PC.

Figure 22
Listener IP tab



Trace tab

This option is for expert level debugging. The Trace feature is turned off by default. Use this feature only for debugging purposes.

Running the i2050 Software Phone for the first time

Start the i2050 Software Phone in one of the following ways:

- Select *Start>Programs>Nortel Networks>i2050 Software Phone*.
- Click on the desktop shortcut (if one was created during the installation).
- Automatic startup sequence.

Note: If you want the i2050 Software Phone to start automatically when the machine boots up, create a shortcut to the application in the Startup folder.

When an i2050 Software Phone is started for the first time and connects to the network, it needs to execute the following start-up sequence:

- Get the IP parameters.
- Find a gateway server and authenticate the user.

As the i2050 Software Phone registers with the Voice Gateway Media Card:

- If a non-null node password is enabled, it prompts for a node number and password. Enter the node number and password using the keyboard or numeric keypad. After the password is verified, enter the TN of the i2050 Software Phone. Refer to *IP Line: Description, Installation and Operation* (553-3001-204) for more on the password feature.
- If the null node password is configured and enabled, these screens are skipped and no option is provided to change the password.
- If the node password is disabled or not configured, it prompts for a node number and TN. Enter the node number and TN using the keyboard or numeric keypad.

The i2050 Software Phone is now configured and can be used.

Changing the TN of an existing i2050 Software Phone

This procedure is required for a new user of the i2050 Software Phone application.

Procedure 16

Changing the TN of an existing i2050

- 1 Exit the i2050 Software Phone application.
- 2 Restart the i2050 Software Phone application.

If the node password is not configured, or is configured but disabled, go to Step 3.

If the node password is configured and enabled for the node, go to Step 4.
- 3 During startup, the i2050 Software Phone registers again with the TPS and the i2050 Software Phone displays the existing node number and TN for approximately five seconds.
- 4 If the password is configured and enabled for the node, the node number and password prompt displays for approximately five seconds; enter the correct password within this five-second period.

If the user activates the **Clear** soft key during the five-second period, the existing node and TN are cleared and the user is prompted for new parameters.

End of Procedure

Removing i2050 Software Phone from service

Procedure 17

Removing an i2050 from service

- 1 Exit the i2050 Software Phone application.
- 2 Uninstall the i2050 Software Phone application from the PC by removing it through Windows Add/Remove Programs.
- 3 In LD 11, OUT the TN.

End of Procedure

Configure programmable line (DN)/feature key labels

Contents

This section contains information on the following topics:

Reference list.....	117
Overview.....	117
Language considerations.....	118
Changing feature key labels	120

Reference list

The following is the reference for this section:

- *IP Line: Description, Installation and Operation* (553-3001-204)

Overview

Internet Telephone feature key labels can be customized by the users. Users can program the label using the Internet Telephone keypad. The programmable line (DN)/feature key labels feature is available on the i2002 Internet Telephone, the i2004 Internet Telephone, and the i2050 Software Phone.

Feature description

The profile of feature key labels for each Internet Telephone is stored in the system's database.rec file on the Call Server and is retrieved during sysload of the Call Server.

When the Internet Telephone registers, the Call Server looks up feature key labels in memory based on the TN. If labels are found, they are sent to the Internet Telephone through SSD messages during the key map download.

The file is stored on the Call Server's directory c:/u/db/database.rec. During a Call Server sysload, the label information is retrieved from the file to the memory. During Call Server EDD, the information is dumped to the file.

When the feature key labels are changed, the information is sent to the Call Server and stored in the Call Server memory. If the Call Server is cold started before EDD is performed, the information is lost.

This feature is currently only available on Succession CSE 1000 Release 2.0 systems.

Language considerations

The feature keys are displayed on the Internet Telephone using the same characters and language as when it was programmed. If the language changes, then the labels change if the new language changes the character set on the Internet Telephone. However, the new characters are not translated to the new language. The stored character code is displayed as the character it maps to in the selected ISO character table.

The following are language change scenarios:

- Enter a label with English characters when the language is set to English. Change the language to Japanese. The label continues to be displayed in English characters.

- Enter a label with English characters when the language is set to Japanese. Change the language to English. The label will be displayed in English characters.
- Enter a label with Japanese characters when the language is set to Japanese. Change the language to English. The label appears in special characters that map from the English ISO table to the Japanese.

Procedure 18

Configuring feature keys

- 1 Press the Services key.
- 2 Select the Change Feature Key label then press the Select soft key.
- 3 Select Change Feature Key label.
- 4 Press Select to select a feature key.
- 5 Press a feature key.

Figure 23

Feature key label editor

Edit the Feature key label			
<The new label displays here>			
Select	Delete	Clear	More...
Select	CASE	Cancel	More...
Select	Symbol/Text	Choose	More...

- 6 Enter the new information for the feature key label.
To enter special characters, press the up navigation key.
Note: If you enter a prime DN key, an error message displays.
- 7 After the information is entered, select the Select soft key.
The feature key labels are saved to the Call Server memory.

Changing feature key labels

Feature key labels can be restored to the default values. You can choose to restore all feature keys that are labelled or only one.

If a feature key label is labelled for an autodial key, the label does not change if the autodial key information changes. For example, the autodial key is programmed for your home telephone number and the feature key is labelled Home. If the autodial programming changes to your Tech Support line, the feature key label remains unchanged and displays 'Home'.

Procedure 19

Changing feature key labels

- 1 Press the Services key.
- 2 Select the **Change Feature Key label** then press the **Select** soft key.
 - a. Select **Restore all key labels**.
 - b. Select the **Yes** soft key to change all feature keys to the default values.

Note: When **Yes** is selected and the values are changed to the default values, you can not undo the change. Feature key labels are erased in the Call Server memory. The label settings must be re-entered.

- c. Select **Restore one key label**.
 - i. Press **Select**.
 - ii. Press a feature label key.
 - iii. Select **Yes** to change the selected feature label key to the default value.

End of Procedure

Table 19
Change Feature keys screen features

Select this key...	To...
Delete	Backspace one character.
Cancel	The action is aborted. The display returns to the default Change Feature Keys submenu.
Case	Switch the next character to either uppercase or lowercase.
More	Switch pages.
Number 1-9	Toggle characters.
Up navigation	Display a screen to enter special characters. Use the Up and Down keys to navigate through the lists of available special characters.
Right/left navigation	Move cursor location. When reviewing special characters, use these keys to select a character in the line display.
Choose	Select a special character. This option is available when reviewing the special characters.
Text	Close the special character display. No special character is selected. The display returns to the default Change Feature Keys submenu.

802.1Q description

Contents

This section contains information on the following topics:

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802.1Q protocol standard	124
i2004 and i2002 Internet Telephone support	125
i2050 Software Telephone support	126
Three-Port Switch support	126
VLAN IDs	127

Overview

The 802.1Q VLAN support is available for both i2002 and i2004 Internet Telephones and the i2050 Software phone (through the PC's operating system).

The 802.1Q VLAN support is configured from the user display interface of the i2002/i2004 Internet Telephones. Configure 802.1Q VLAN support when you initially configure an Internet Telephone.

802.1Q protocol standard

The 802.1Q IEEE protocol standard allows virtual LANs (VLANs) to be defined within a single LAN. This improves bandwidth management and limits the impact of broadcast and multicast messages. A higher level of security between segments in a network can also be achieved.

Currently customers must configure the VLAN and packet priority at the network switch port for each Internet Telephone. Supporting 802.1Q in the Internet Telephones simplifies this configuration and moves it to the end device. The network switching equipment must still be capable of recognizing and processing the 802.1Q header.

Only i2002 and the i2004 Internet Telephones and the i2050 Software Phone running on a PC configured with 802.1Q can generate the 802.1Q header. The switch ports for Voice Gateway Media Card TLAN ports must be configured as untagged ports so the header is removed.

Note: 802.1Q functionality is supported only on the Internet Telephone. The IP Line application's IP stack does not provide 802.1Q support for the ITG-P or SMC.

802.1Q feature description

The p bits within the 802.1Q standard allow packet prioritization at Layer 2 improving network throughput for VoIP data.

The 802.1Q standard specifies a new format of Ethernet frame. A standard Ethernet frame contains:

- a header consisting of a six-byte destination MAC address
- a six-byte source MAC address
- a two-byte protocol identifier

Following the header is a data area.

The 802.1Q formatted frame is identical to a standard Ethernet frame, with the exception of the 4-byte 802.1Q tag that is inserted between the source MAC address and the protocol identifier. The first 16 bits of the 802.1Q tag

field is the Tag Protocol Identifier containing 8100 (hex), allowing the Ethernet interface to distinguish it from standard Ethernet frames. The last 16 bits of the 802.1Q tag contain the following information:

- a 3-bit Priority field (the 802.1p defined bits)
- a 1-bit Canonical Field Identifier (CFI)
- a 12-bit VLAN ID field

i2004 and i2002 Internet Telephone support

The i2002 and i2004 Internet Telephones support 802.1Q as follows:

- 802.1Q can be enabled or disabled at boot time using manual configuration or control downloaded from the TPS.
- If 802.1Q is disabled, standard Ethernet frames are transmitted.
- If 802.1Q is enabled, all frames transmitted by the Ethernet driver have the 802.1Q tag bytes inserted between the source MAC address and the protocol type field. The tag protocol identifier field contains 8100(hex) and the CFI bit is set to 0.
- When 802.1Q is enabled, the priority bits of all frames are set to 6 (octal) and the VLAN ID is set to 000(hex) by default. The GUI and TPS configured values override these values.
- The Internet Telephone's Ethernet driver receives any Ethernet frame destined for it, regardless of whether 802.1Q is enabled or whether the received frame is an 802.1Q tagged frame.

Note: The only exception is any 802.1Q tagged frame with the CFI=1. In this case the frame is discarded.

- The Internet Telephone's Ethernet driver strips the 802.1Q tag information from the frame prior to passing it on to the IP stack. Priority and VLAN information on received frames is not preserved and is ignored.

For more information on configuring 802.1Q on an i2002 Internet Telephone, see “First-time i2002 Internet Telephone installation” on page 23.

For more information on configuring 802.1Q on an i2004 Internet Telephone, see “First-time i2004 Internet Telephone installation” on page 50.

i2050 Software Telephone support

The i2050 software phone supports 802.1Q with Windows 2000. By default, when 802.1Q is enabled, the priority bits of all frames are set to 6 and the VLAN ID is set to 0 (a restriction of Windows 2000).

For more information, see the i2050 Software Phone section: “QoS tab” on page 106.

Three-Port Switch support

The i2004 Internet Telephone three-port switch does not interpret the 802.1Q header, but rather, allows the packets to pass through unmodified. Priority is achieved on a per port basis. The phone “port” traffic has higher priority over the Ethernet port to which the PC is connected.

An Internet Telephone can receive Broadcast frames from a PC’s data VLAN. Any data network broadcast storm packets from the network are seen by the Internet Telephone. This type of traffic does not adversely affect the Internet Telephone.

VLAN IDs

The VLAN ID field can be specified on a “per interface” basis. There is only one network interface on the Internet Telephone, therefore, the VLAN ID field is a “global” setting. That is, all packets transmitted by the Internet Telephone have the same VLAN ID.

The VLAN ID is specified as follows:

- The default VLAN ID is 000 (hex).
- The VLAN ID can be specified in the manual configuration user interface or by the DHCP parameter when using the Automatic VLAN discovery using DHCP approach.

Automatic VLAN ID configuration

As part of the 802.1Q feature, there is an option to automatically discover the VLAN ID using DHCP. This process reduces the configuration steps since entering data manually (the VLAN ID) is not required.

When the Automatic VLAN Discovery using DHCP approach is used, and the Internet Telephone has been configured as such, the following steps are automatically taken to obtain the VLAN ID:

- 1 The i2002/i2004 does an initial DHCP Discovery Request in the default VLAN.
- 2 The DHCP server returns a DHCP Ack message with an IP address in the data VLAN and one or more voice VLAN IDs in the vendor-specific field.
- 3 The telephone reads and saves the voice VLAN IDs.
- 4 The telephone rejects the DHCP offer (accepts it but immediately gives up the lease).
- 5 The telephone reboots and sends a DHCP Discovery Request with the first VLAN ID from the saved list. This is repeated for each VLAN ID in the list until a response is received.

This works because the Layer 2 switch discards every DHCP Discovery Request it receives from the Internet Telephone if the VLAN ID does not match the VLAN IDs configured on the port. When the Internet Telephone sends a DHCP Discovery Request with the port's configured VLAN ID, the packet passes into the network and the DHCP server's Ack message is passed back.

When a DHCP Ack message is received, the Internet Telephone accepts the offer and saves the IP address and Node IP address.

Corporate Directory

Contents

This section contains information on the following topics:

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Special characters	131
Operating parameters for the Corporate Directory	131
Corporate Directory Views	134
Call Server Configuration	136

Reference list

The following are references for this section:

- *IP Line: Description, Installation and Operation* (553-3001-204)
- *Installing and Configuring Optivity Telephony Manager* (553-3001-230)

Overview

The Corporate Directory feature available on Internet Telephones is similar to the existing M3900 Corporate Directory feature.

A system database is created either from Optivity Telephony Manager (OTM) information or from a corporate LDAP server. This database is downloaded and stored on the system CPU platform and is accessible from the Internet Telephones.

Corporate directory extends the use of this database to the Internet Telephones. The corporate directory lookup feature works during call transfer and conference operations.

Corporate Directory feature operation

The i2002, i2004, and i2050 Internet Telephones provide access from the telephone to a corporate wide directory. The Corporate Directory is accessed through the Directory Key. The Corporate Directory provides the following features:

- Users can search by name.
- Users can view additional information on each entry.
- Users can dial from the Corporate Directory.
- Provides an alphabetical list of entries using the last names (system generated).
- The system administrator can configure OTM to download the directory database manually or automatically to the system.

Operating parameters for the Corporate Directory

The following operating parameters apply to Corporate Directory:

- The user must have an i2002, i2004, or i2050 Internet Telephone to support the Corporate Directory feature.
- To access the Corporate Directory from the telephone, the user must have the Corporate Directory Class of Service enabled. See “Call Server Configuration” on page 136.
- When the Corporate Directory is being updated with new data, the user cannot access the Corporate Directory.
- The user exits the Corporate Directory by pressing the Quit Key or the Directory Key.
- The Corporate Directory feature is only available on Succession CSE 1000 Release 2.0 systems.
- The OTM Corporate Directory utility gathers data from the OTM databases and downloads it to the Succession CSE 1000 system. To use the Corporate Directory utility, OTM 2.0 or later must be installed. For more information, refer to *Installing and Configuring Optivity Telephony Manager* (553-3001-230).

Special characters

The special character set includes all characters from the extended portion of the ASCII character set. The extended ASCII character set that supports the Internet Telephone's current language is the character set appears in the edit mode. The special character set contains up to 130 characters. It is displayed in six lines with 24 characters on each line. Use the navigation keys to scroll through the list or to move through a 24-character line.

The special character set does not include upper- and lower-case letters or numerals. Use the keypad of the Internet Telephone to define these characters.

Procedure 20
Accessing the Corporate Directory

- 1 Press the Directory key on an Internet Telephone.

A list of applications available displays.

- 2 Highlight Corporate Directory then press the Select soft key.

- 3 Go through the Status Query process.

- 4 Enter a name then select Search.

You can enter special characters in the search parameters. The special characters include some symbols (for example, +, -) and international characters.

- 5 To enter special characters, press the Up navigation key.

The special characters display.

- 6 Use Up/Down keys and Right/Left keys to review the special characters available.

The Corporate Directory may not be available for the following reasons:

- The Corporate Directory is locked. The message "Try again Later" displays.
- The Corporate Directory file is not available. The message "Directory unavailable" displays.
- The class of service is not configured for the Internet Telephone.

Review Table 20 on page 133 for more information on Search/Edit screen features. The features in Table 20 apply to i2002, i2004, and i2050 Internet Telephones.

Table 20
Search and Edit screen features

Select this key...	To...
Delete	Backspace one character.
Cancel	Close the Corporate Directory.
Case	Switch the next character to either uppercase or lowercase.
Search	Search for directory entries. Results are displayed in either a List View screen or No Match screen.
More	Switch pages.
Number 1-9	Toggle characters.
Up navigation	Display a screen to enter special characters. Use the Up and Down keys to navigate through the lists of available special characters.
Right/left navigation	Move cursor location. When reviewing special characters, use these keys to select a character in the line display.
Choose	Select a special character. This option is available when reviewing the special characters.
Text	Close the special character display. No special character is selected. The display returns to the default Search/Edit screen.

Corporate Directory Views

There are two search results screen available with the i2004 Internet Telephone and the i2050 Software Phone:

- Card view
- List view (default view)

If a search was successful and entries were found in the directory, the first match displays on the screen.

Note: If there is no match to the search query, you can choose to either start a new search or change the information in the initial search.

Card view

The Card view is available only on i2004 and i2050 Internet Telephones. The Card view provides the following information about the name found in the directory: name, telephone number, and department name.

Table 21
List view and Card view screen features (Part 1 of 2)

Press this key...	To...
Up or Down	Scroll through the list of directory entries that match your search criteria.
Right	On the i2004 and i2050, the view changes to the Card view where the name, phone number, and department are displayed.
Left	In Card view only, returns to List view.

Table 21
List view and Card view screen features (Part 2 of 2)

Press this key...	To...
Dial	Dials the selected DN. — If there is no DN number associated with the directory entry, a message displays (“No number in directory”). — If there is no available DN key, a message displays (“No available line”). When displayed, select Done to return to the List view or Card view.
NewFind	Returns to the Search/Edit screen.
Resume	Returns to the Search/Edit screen with the previously entered name displayed. Appears on both views.

Call Server Configuration

You can change the call server configuration while Internet Telephone users are logged on to the Corporate Directory. The changes only take affect when the user logs off and then logs on again to the Corporate Directory.

LD 11 needs to accept CRPA/CRPD class of service input for Internet Telephones.

Table 22
Corporate Directory: LD 11 Configuration

Request	Input	Description
REQ:	NEW/CHG	Enter main command.
TYPE:	I2002/I2004/ I2050	Enter terminal type.
TN:	I s	Enter set TN.
... ..		
CLS	CRPA/CRPD	Enable/Disable corporate directory feature for this TN.

Virtual Office and Branch Office

Contents

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Reference list

The following is the reference for this section:

Branch Office (553-3023-221)

Overview

Virtual Office is a Succession CSE 1000 feature that is provided with IP Line 3.0. It is available to offices where a Signaling Server is equipped.

The Branch Office feature provides a means of extending system features to one or more remotely located Branch Offices.

Virtual Office

The Virtual Office feature enables the user to login to any Internet Telephone within a network of Succession CSE 1000 systems to temporarily use their own directory number on a different physical Internet Telephone. This feature is useful when a user is at a different workstation or is working from an off-site location.

The User ID and a pre-configured Station Control Password (SCPW) determine the home telephone proxy server. The telephone can then receive service from a different telephone proxy server and Call Server (CS) than it usually does.

To use Virtual Office, the end user selects Virtual Office Login. A screen displays where the end user enters a User ID (the user's dialable ESN DN), followed by a SCPW password-prompt screen. For a user to end an Internet Telephone Virtual Office session, the user selects Virtual Office Logout by pressing the Services key and selecting the corresponding entry on the menu.

The system allows a user who is already logged in from a source telephone to login from the destination telephone under Virtual Office. This can be useful if the user forgets to logout of an Internet Telephone.

Virtual Office login works with Multiple Appearance Directory Numbers (MADN). The remote login does not affect either a digital or analog telephone sharing an MADN with the Internet Telephone, or a second telephone with a different DN assigned to the user.

During a Virtual Office login, if the User ID is not found provisioned within the local CS, the Gatekeeper provides the Home TPS. This is also referred to as the Remote TPS, as it is expected to be across the WAN.

A Signaling Server must be present at the remote office for a remote Virtual Office login to that office. When using a Virtual Office login, dialling 911 routes through the PSTN of the remotely homed location. The terminal used for a remote Virtual Office login displays the time and date of the remote Call Server.

Under a Virtual Office login, if connectivity to the remote office is lost, established calls are not maintained. The telephone then reboots and registers to its usual TN and CS.

Voice quality during Virtual Office connection can be less than ideal, because codec selection is based on the set being in its expected location. Firmware upgrade from the TPS to the Internet Telephone does not occur during Virtual Office login.

Telephone options are retained within the telephone regardless of login.

Virtual Office feature operation

Virtual Office allows an Internet Telephone to dynamically change the Call Server providing its call service. The feature is different from the M3900 Virtual Office feature, that dynamically allows a telephone to change DNs, but not Call Servers.

A Virtual Office login is used when call service is temporarily desired on a different physical Internet Telephone. The telephone where the user wants to virtually login (destination) must have Virtual Office User Allowed (VOUA) class of service. The telephone where the user wants to login from (source) must have Virtual Office Login Allowed (VOLA).

The Virtual Office feature supports only one customer. If there is more than one customer configured in the system, then the Virtual Office feature is available to the customer with the lowest customer number.

The Virtual Office feature only supports Virtual Office Login between Call Servers which are configured as endpoints in the same Gatekeeper. Virtual Office Login between Internet Telephones in Call Servers configured as endpoints of different Gatekeepers is not supported.

Virtual Office login

Note: On the i2002 Internet Telephone, only a single line displays at a time. Use the up and down arrows to navigate through the menus.

Procedure 21

Login to the Virtual Office

- 1 Press the Services key  on an idle Internet Telephone to display the Options menu.

Figure 24

Accessing Virtual Office

Options	Jan 01 12:17am
Telephone Option Virtual Office Login	
Select	Cancel

- 2 Select Login to display a User ID screen, followed by a password-prompt screen (Figure 25 on page 142).

3 Enter a UserID and password.

UserID	The UserID is the dialable DN. It must be an ESN number. The DN can be: • A UDP number. For example, 6 343 5555 where 6 is the access code, 343 is the HLOC, and 5555 is the DN. • A CDP number. For example, 1234. • A transferable DN. The UserID accepts only numeric values.
Password	The home SCPW or the SCPW at the destination TN. A password must be configured otherwise an error displays: Permission Denied (3) It is recommended that the password have a minimum of four digits.

Note: The UserID is locked for one hour after three incorrect password entries. An error message (SRPT0073) is written to the CS history file and printed to the TTY.

The lock provides "password-guessing protection." Disable and then enable the TN in LD 32 to remove the lockout.

Figure 25
Enter User ID and Password

Enter User ID:			
Select	Delete	Clear	Cancel

Enter Password:			
Select	Delete	Clear	Cancel

When the DN is an MADN, the TN whose SCPW matches the user-entered password is selected. If preferred, a separate, secondary, single appearance DN unique to the user can be assigned. When the user logs in with that DN, the user is uniquely identified and the key map downloaded; the user still gets their full DN/feature key list including the MADN DN. This same work-around should be used for ACD agents requiring the Virtual Office login.

When login is attempted, the home Internet Telephone or previously logged-in Virtual Office Internet Telephone is taken offline by the connected CS. This auto-logout applies only to Internet Telephones.

When the User ID entered is not found locally, the user is presented with the message, "Locating Remote Server," to indicate that the connection setup is ongoing (Figure 26). A Nortel Networks CSE 1000 Gatekeeper provides the Home TPS for the User ID. The local TPS confirms connectivity to the remote TPS, and the Internet Telephone is redirected to the remote Home TPS.

**WARNING**

Network Problems During Login:

SETUP:

This situation occurs when the Virtual Office login is a remote login and the Internet Telephone where the login is initiated is on a different subnet from its associated TPS and has a different route to the remote office. If the local TPS can connect to the remote office but the Internet Telephone cannot, then the login does not succeed but there is no error message indicating that there is a problem.

SYMPTOM:

The Internet Telephone is registered to the local TPS and is redirected to the remote office (displaying the "Locating Remove Server" message). When it does not successfully register at the remote office, it returns to the local TPS (displaying "Server Unreachable"). The Internet Telephone registers with the original DN not with the Virtual Office login.

CONSEQUENCE:

The Internet Telephone does not successfully provide the Virtual Office connection.

DIAGNOSIS:

To confirm there is a network problem, check if a ping succeeds from the Internet Telephone's subnet to the remote office TPS subnet.

Figure 26
Locating Server

Succession	Jan 01 12:17am
Locating Remote Server....	
Cancel	

The system allows a user who is already logged in to login again. This can be useful if one forgets to logout of an Internet Telephone. By logging in again, the system automatically logs off the currently logged-in instance and de-registers that Internet Telephone.

When attempting to login, if there is an existing login to the same User ID or a home telephone for the User ID and it is not in idle state (for example, ringing, ringback or in a call), the new login attempt gets a "Login Busy" message.

Other telephones sharing a MADN with the Internet Telephone, or a second telephone with a different DN assigned to the user, is not affected by the remote login unless the login resolves to the same TN.

Table 23
Internet Telephones a user can virtually log into

	use Virtual Office feature from i2002	use Virtual Office feature from i2004	use Virtual Office feature from i2050
i2002 users	✓	✓	✓
i2004 users		✓	✓
i2050 users		✓	✓

Preempting

Telephones on the system are registered to the Call Server while they are in use. When not in use, their registration may be forced to logout to allow registration of another telephone that is needed for use. A telephone that is preempted is registered to the TPS only.

A forced logout of a Branch User is not at risk of being accidentally replaced. To logout an Internet Telephone or to register after being logged out, a full login is required. A Home telephone registration, or an automatic Branch User registration (where the Branch User ID and Main Office Terminal Number are already configured), does not normally pass along the system control password (SCPW) or Internet Telephone Installer Password, so it would therefore be rejected if the Main Office TN last logged out a telephone to register another telephone.

If the telephone has been forced-logout, the Virtual or Branch User soft key shows on the telephone display (see Figure 27). The telephone is not operational in this mode.

Figure 27
Virtual or Branch Soft key display

Succession	Jan 01 12:17am
Logged Out	
Virtual	Branch

There can be only one registration for a TN within a CS. A virtually logged-in telephone that is preempted attempts to register with the CS associated with it is S1 and TN. If the TN has a Virtual Office login or Branch User login, it does not register to its CS, but awaits login (see Figure 26). The preemption only occurs if that instance is idle.

When a home telephone is preempted, it remains registered to the TPS but not to the CS. The telephone can be used by someone else for a Virtual Office login or be re-registered as the home telephone. Re-registering as the home telephone requires the login (User ID and password) to authenticate the user. A successful login on the home telephone by the home telephone's configured user, registers the user as a regular user, not as Virtual Office, on the home telephone.

Operation During Virtual Office Connection

Once virtually logged in, the Internet Telephone receives the features, time, date, and tones of the Home CS and the telephone becomes part of the home zone. When this zone is remote, the voice quality can be less than ideal because codec selection is based on the telephone being in its expected location (subnet).

Note: Firmware upgrade on a TPS node does not upgrade the telephones logged in through Virtual Office.

After successful Virtual Office login, the telephone's key layout and feature capabilities of the registered TN instance are transferred to the Internet Telephone. The User ID appears on the telephone's display (see Figure 28 on page 147). The telephone then receives call service from this CS.

Figure 28
Logged In - Screen While Idle

			
User: xxx xxxx <the DN String>			
Trans	Conf	Forward	More...

When an i2002 end user logs in on an i2004 or i2050 Internet Telephone, the key map is as shown in Figure 29. Because the telephone is now an i2004 or i2050, the Shift key is disabled.

Figure 29
Key map for i2002 VTN logged in from i2004 or i2050

	<i>i2004 Key 2</i>
	<i>i2004 Key 1</i>
<i>i2004 Key 3</i>	<i>i2004 Key 0 (PDN)</i>
Succession	08/11 3:10 AM

The Internet Telephone options, stored locally in the Internet Telephone's non-volatile memory, affect the user logged in through Virtual Office. If the language on the logged-in telephone and the home telephone are different, the following features may be different depending on the home telephone settings:

- display contrast
- language
- date and time format
- local dialpad tones
- ring type
- call timer
- onhook default path
- feature key labels

If the settings on a logged-in Internet Telephone change, the Internet Telephone retains the settings after logging out, powering up, or rebooting. Changes to the Telephone Options menu items are retained in the telephone's EEPROM regardless of who is logged in.

When virtually logged in, the Options menu is as shown in Figure 30.

Figure 30
Virtual Office Options menu

Options	Jan 01 12:17am
Telephone Option Virtual Office Logout	
Select	Cancel

When connected to a CS through Virtual Office, local trunks are the home Central Office (CO). An emergency service call is directed to the home PSTN.

Virtual Office Logout

The user is logged out from Virtual Office in one of the following ways:

- In the Options menu, select Virtual Office Logout (see Figure 30).
- Return to the home location and re-register (preemption).
- Log in through the Virtual Office feature on another set (preemption).
- The telephone used for a Virtual Office connection power cycles.
- Connectivity to the Home TPS is lost.
- The automatic logout provisioned for the customer is activated.

When the user logs out, the Internet Telephone returns to its regular key map unless the TN owner is virtually logged in or Branch User is logged in. In these instances, the Internet Telephone displays the “Login Ready” screen. If connectivity to the home office is lost during a Virtual Office login, calls are not maintained and the Internet Telephone registers to its usual TN and CS.

If the customer is configured to automatically log out all Virtual Office connections, the Virtual Office logins are logged out at the provisioned hour. The automatic logout, if chosen, prompts for the hour when the logouts are initiated.

Succession Branch Office

Similar to Virtual Office, Succession Branch Office allows an Internet Telephone to dynamically change the CS providing its call service. Call service is received remotely from the Main Office on an ongoing basis, commonly referred to as Normal mode. When connectivity to the Main Office CS is lost, service is redirected to local call service at the branch. Local call service at the branch is referred to as Survival or Local mode. Service is automatically redirected back to the Main Office once connectivity is restored.

Succession CSE 1000 Branch Office is a feature that allows a secondary location to centralize the call processing of its IP-based communications network. The Call Server at the Main Office provides the call processing for the Internet Telephones in both the Main Office and Branch Offices. The H.323 WAN Gateway in the Branch Office provides access to the local Public Switched Telephone Network (PSTN).

The Succession CSE 1000 Branch Office is connected to the Main Office over a virtual trunk on a WAN. Internet Telephone calls and IP network connections are controlled by, and come from, the Main Office. If the Main Office fails to function, or if there is a network outage, the Succession System Controller (SSC) at the Branch Office provides service to the telephones located in the Branch, enabling them to survive an outage between the Branch Office and the Main Office.

For branch users registered to the Main Office (which they normally are), the Main Office provides music to the user, if Music on Hold is provisioned. The use of G.729A/AB and G.723 codecs between the Main Office and the Branch Office impacts the music quality.

The basic hardware of a Branch Office includes the H.323 WAN Gateway and the Signaling Server. The H.323 WAN Gateway provides access to the local PSTN for users in the branch. It also provides support for analog devices such as fax machines or telephones in the Branch Office.

**CAUTION — Service Interruption**

If the network is planned in a manner in which the Internet Telephones have a different route to the Main Office than does the Branch TPS, then a fault condition is possible.

When the Branch TPS can "ping" the Main Office but the Internet Telephone cannot due to a network outage, an Internet Telephone registration can force the telephone into a cycle of registering locally, being re-directed to the Main Office, rebooting and then registering locally again. When this behavior is observed, a network outage requires diagnosis.

Set-based installation for branch Internet Telephones

Nortel Networks recommends using set-based installation to install Branch Office Internet Telephones. Set-based installation takes less time than traditional telephone pre-configuration, as it requires only one configuration, rather than two.

Procedure 22

Installing Internet Telephones using the set

This procedure installs an Internet Telephone at the Branch Office and Main Office. The system administrator and a trusted user can perform a set-based installation when the Branch Office is in Local mode.

- 1 On the Internet Telephone, configure the S1 (primary connect server) (choose DHCP, or manually enter the IP address of the local TPS node). As shown in Figure 31, enter the node number and password.

The node number and the Terminal Proxy Server (TPS) are at the Branch.

Figure 31

Set-based Installation step 2

Connect SVC	Jan 01 12:17am		
Node : ____			
Password : _____			
OK	BKSpace	Clear	Cancel

- 2 Enter the TN and press **OK** (see Figure 32).

Figure 32
Set-based Installation step 3

Connect SVC	Jan 01 12:17am		
TN: ____			
OK	BKSpace	Clear	Cancel

- 3 Wait for the default key map to download. The screen appears as shown in Figure 33.

Figure 33
Set-based Installation step 4

Succession	Jan 01 12:17am
Node: 1____ TN: 61.0_	
Reset	

- 4 Lift the handset and listen for the continuous dial tone. The Model prompt is displayed in Figure 34 on page 154.

Figure 34
Set-based Installation step 5

Succession	Jan 01 12:17am
Model? (20)	

- 5 Press the # key to select the default model, or enter the model number and press #.

Listen for a special tone. The following prompt appears.

Figure 35
Set-based Installation step 6

Succession	Jan 01 12:17am
OK, ZONE? (0)	

- 6 Enter the zone number as assigned in the branch zone data at the Main Office. Press #.
- 7 Enter the extension number and press #, as shown in Figure 36 on page 155.

Figure 36
Set-based Installation step 8

Succession	Jan 01 12:17am
OK, EXTENSION? 2244	

- 8 Listen for a relocation tone and the screen displays **OK**. Replace the handset.
- 9 Wait approximately 10 seconds for key map download to complete. The telephone is now registered with the SSC and is now fully operational. See Figure 37.

Figure 37
Set-based Installation complete - step 10

Succession	Jan 01 12:17am		
Trans	Conf	Forward	More...

- 10 Test for survival functionality by making and receiving a call from the telephone.

The telephone is now configured for basic operation and survivability.

_____ **End of Procedure** _____

Branch User configuration on Internet Telephones

To complete the configuration of the Branch User telephone, an administrator or trusted user can set up the telephone with the Branch User Config command (with the Internet Telephone Installer Password).

If the Branch User ID and Main Office TN are not configured, the Internet Telephone registers at the Branch Office SSC, and stays in Local Mode. The Branch User Config is the mechanism to enter the Branch User ID and Main Office telephone number so that the Internet Telephone can be redirected to the Main Office to run in Normal Mode. Branch User Config is the third option on the option menu display, which is available to the Branch User.

For more information on Branch user configuration, refer to *Branch Office* (553-3023-221).

Diagnostics

Table 24
Normal operation troubleshooting (Part 1 of 2)

Displayed Message	Probable Cause	Actions
Local Mode	Test Local mode.	Press Services key, and then select Resume Normal Mode. Note: The STAT c u command in LD 32 shows the reason why the Branch User stays in local Mode.
	Gatekeeper is down.	Restore Gatekeeper.
	Link to gatekeeper is down.	Restore Link to Gatekeeper.
	Main Office TPS is down.	Restore Main Office Signaling server.
	Link to Main Office TPS is down.	Restore Link to Main Office TPS.
Local Mode Invalid ID (1)	Gatekeeper unable to find end point from Branch User ID.	Check Gatekeeper database and update as required.
	Branch User ID not found in any equipped TN.	Check Main Office Branch User configuration, and update as required.

Table 24
Normal operation troubleshooting (Part 2 of 2)

Displayed Message	Probable Cause	Actions
Local Mode Invalid ID (2)	Branch User ID not found in any equipped TN.	Check Main Office Branch User configuration, and update as required.
Required FW Vers	Firmware incompatible with Main Office TPS.	Upgrade Internet telephone firmware at the Branch Office TPS and then re-power the Internet Telephone. Note: Nortel Networks recommends that all Branch Office TPS should be upgraded before the Main Office TPS is upgraded during firmware upgrade. Then the Internet Telephones will be directed back to the Branch Office for firmware upgrade and then redirected back to the Main Office automatically.

Table 25
Branch User Config troubleshooting (Part 1 of 4)

Displayed Message	Probable Cause	Actions
Busy, try again	Incorrect Branch User ID entered.	Retry with correct Branch User ID.
	Main Office TN already equipped, and is active on a call.	Identify duplicate Branch User ID allocation, and make correction accordingly.
Invalid ID (1)	Incorrect Branch User ID entered.	Retry with correct Branch User ID.
	Branch User ID not in Gatekeeper database.	Update Gatekeeper database to include Branch User ID.
Invalid ID (2)	Incorrect Branch User ID entered.	Retry with correct Branch User ID.
	Branch User ID not configured at Main Office.	Configure Branch User ID in Main Office TN.
	Main Office TN associated with the Branch User ID and the programmed TN on the Internet telephone does not match.	Configure a Main Office TN to match the Internet Telephone TN. -or- Configure a new Branch Office TN and Internet Telephone TN to match the Main Office TN.
Locked from Login	Failed to enter the correct Branch Office TPS Internet Telephone Installer Password, or Temporary Internet Telephone Installer Password three times.	Wait one hour for the lock to clear automatically. -or- Use the clearLockout command on the Branch Office IPL maintenance terminal to clear the lockout.

Table 25
Branch User Config troubleshooting (Part 2 of 4)

Displayed Message	Probable Cause	Actions
	Failed to enter the correct Station Control Password in the Main Office TN.	Wait one hour for the lock to clear automatically. -or- Disable and then enable the Main Office TN in LD 32 to clear the lockout.
	Failed to enter the correct Main Office Internet Telephone Installer Password, or Temporary Internet Telephone Installer Password three times.	Wait one hour for the lock to clear automatically. -or- Use the clearLockout command on the Main Office IPL maintenance terminal to clear the lockout.
Permission Denied (1)	Internet Telephone Installer Password or Temporary Internet Telephone Installer Password at the Branch Office TPS not configured or disabled.	Set or enable Internet Telephone Installer Password or Temporary Internet Telephone Installer Password at the Branch Office TPS.
Permission Denied (2)	Incorrect Branch User ID entered.	Retry with correct Branch User ID.
	Internet Telephone Installer Password at the Main Office TPS not configured or disabled and the Branch User ID is already assigned to a user in another Branch Office.	Identify duplicate Branch User ID allocation, and make correction.
Permission Denied (3)	Incorrect Branch User ID entered.	Retry with correct Branch User ID.

Table 25
Branch User Config troubleshooting (Part 3 of 4)

Displayed Message	Probable Cause	Actions
	Incorrect Internet Telephone Installer Password at the Main Office TPS entered.	Retry with correct Internet Telephone Installer Password at the Main Office TPS.
	Station Control Password not configured in Main Office TN.	Add Station Control Password to the Main Office TN.
Permission Denied (4)	Terminal type configured in the Main Office TN does not match the type of the Branch Office Internet telephone.	Change the terminal type in the Main Office TN to match the type of the Branch Office Internet telephone. -or- Replace the Branch Office Internet with the correct type.
Permission Denied (6)	Incorrect Branch User ID entered.	Retry with correct Branch User ID.
	Incorrect Branch Office Internet Telephone Installer Password, or Temporary Branch Internet Telephone Installer Password entered.	Retry with correct Branch Office Internet Telephone Installer Password, or Temporary Branch Internet Telephone Installer Password.
	Incorrect Main Office Internet Telephone Installer Password or incorrect Station Control Password entered.	Retry with correct Main Office Internet Telephone Installer Password or correct Station Control Password.
Server Unreachable (1)	Gatekeeper is down	Bring Gatekeeper up.
	Link to Gatekeeper is down.	Restore link to Gatekeeper.

Table 25
Branch User Config troubleshooting (Part 4 of 4)

Displayed Message	Probable Cause	Actions
Server Unreachable (2)	Main Office TPS is down.	Bring Main Office Signaling Server up.
	Link to Main Office TPS is down.	Restore link to Main Office TPS.
	Main Office Call Server is down.	Bring Main Office Call Server up.

Table 26
Virtual Office Login Troubleshooting (Part 1 of 2)

Displayed Message	Probable Cause	Actions
Busy, try again	Remote telephone is active on a call.	Wait for remote telephone to become idle and try again.
Invalid ID (1)	Incorrect User ID entered.	Enter correct User ID.
	User ID not in Gatekeeper database.	Update Gatekeeper database to include User ID.
Invalid ID (2)	Incorrect User ID entered.	Enter correct User ID.
Locked from Login	Failed to enter the correct Station Control Password three times.	Wait one hour for the lock to clear automatically.
		-or- Disable and then enable the remote telephone in LD 32 at the remote Call Server to clear the lock.
Permission Denied (3)	Incorrect User ID entered.	Retry with correct User ID.
	Remote telephone has no Station Control Password.	Configure the remote telephone with Station Control Password.

Table 26
Virtual Office Login Troubleshooting (Part 2 of 2)

Displayed Message	Probable Cause	Actions
Permission Denied (4)	Incorrect User ID entered	Retry with correct User ID.
	Attempt to login to a remote i2004 or i2050 telephone from an i2002 telephone	Go to an i2004 or i2050 telephone and try again.
Permission Denied (5)	Incorrect User ID entered	Retry with correct User ID.
	Remote telephone does not have VOUA Class of Service	Configure the remote telephone with VOUA Class of Service.
Permission Denied (6)	Incorrect User ID entered	Retry with correct User ID.
	Incorrect Station Control Password entered.	Select Retry, and try again with the correct Station Control Password.
Server Unreachable (1)	Gatekeeper is down	Bring Gatekeeper up.
	Link to Gatekeeper is down	Restore link to Gatekeeper.
Server Unreachable (2)	Remote TPS is down	Bring remote Signaling Server up.
	Link to remote TPS is down	Restore link to Remote TPS.
	Remote Call Server is down	Bring remote Call Server up.

Internet Telephone maintenance and diagnostics

Contents

This section contains information on the following topics:

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Lamp audit and keep-alive function	168

Overview

Alert: The maintenance commands in this section apply only to the i2002 and i2004 Internet Telephones' TNs. They do not affect the network access of a PC or other network devices connected to the Internet Telephones. Access to the network is affected only when:

- The power to the Internet Telephone is disconnected.
- The LAN cable is disconnected.

Internet Telephone maintenance and diagnostics

In the Internet Telephone, there are two types of TNs:

- A physical TN that represents a physical unit of the IT Line card.
- A virtual TN that is configured on a virtual superloop and represents an Internet Telephone.

The maintenance features apply only to the Internet Telephone. A PC's performance is affected only when:

- The power to the Internet Telephone is disconnected.
- The LAN cable is disconnected.

Physical TNs that are seen as card units, are managed using existing LD 32 commands.

Virtual TNs are configured on virtual superloops. For virtual superloops, the message NPR047 displays in response to LD 32 commands such as STAT, DISL, DISC, DISI, ENLL, ENLC that do not specify the TN down to the Unit level.

IDU commands

The IDU command for Internet Telephones provides information, such as TN, TN ID, NT code, color code, release code and serial number, as well as the IP address of the Internet Telephone and the IP address of the Voice Gateway Media Card to which the set has registered for signaling purposes.

The serial number is the last three bytes of the Internet Telephone's MAC address, printed in hexadecimal format.

The system requests the information from the Internet Telephone and can be used to test the end-to-end IP connectivity of the Internet Telephone. The output format of the IDU command in LD 32 is shown in Table 27. This format applies only to Internet Telephone Virtual TNs.

If the IDU command cannot retrieve the information shown in Table 27, it responds with one of the following:

- Prints the Internet Telephone IP address and the Voice Gateway Media Card address, and generates an NPR0503 message.
- The Internet Telephone is not registered with the call server and an NPR0048 message is generated.
- The Internet Telephone is registered, but the call server is not responding, and generates an NPR0503 message.

Table 27
IDU command printout in LD 32

Item	Description
ISCTN:	l s c u
TN ID CODE:	i2002, i2004, or i2050
NT CODE:	xxxxxx
COLOR CODE:	xx
RLS CODE:	xx
SER NUM:	xxxxxxx
SET IP ADR:	xxx.xxx.xxx.xxx
TPS IP ADR:	xxx.xxx.xxx.xxx

Lamp audit and keep-alive function

The Lamp Audit function provides a continuous source of heartbeat messages to ensure the Internet Telephone is powered and the IP connection is working. Since there is a reliable UDP connection from the Succession CSE 1000 core through to the Internet Telephone, any failure of the Internet Telephone, the Voice Gateway Media Card or the IP connection is detected.

You can run Network Signaling diagnostics as part of the midnight routines with LD 30.

When the TPS detects the Internet Telephone has been disconnected, the IT Line card logs the event and sends an UNREGISTER message to the Call Server for that Internet Telephone.

When the system call server detects a loss of connection with the Voice Gateway Media Card, the system logs a message and UNREGISTERS all of the Internet Telephones and gateway channels associated with that card.

Specifications

Contents

This section contains information on the following topics:

Reference list.....	169
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Reference list

The following is the reference in this section:

- *IP Line: Description, Installation and Operation* (553-3001-204)

Power requirements

i2002 and i 2004 Internet Telephone power requirements

An i2002 or i2004 Internet Telephone is powered by a 16 VAC, 500 mA transformer. Line voltage is different for each country. The i2004 Internet Telephone also accommodates a 48 V dc supply. Power is applied by a “barrel” connector.

You can order i2002 and i2004 Internet Telephones with or without a power transformer. For international orders, you must order a country-specific transformer.

Environmental specifications

Table 28 shows the environmental specifications of the i2002 Internet Telephone.

Table 28
i2002 Internet Telephone—environmental specifications

Parameter	Specifications
Operating temperature	+5° to +40° C, ambient
Operating humidity	+5% to 95% RH (29 g/m3 mean absolute humidity)
Storage temperature	−40° to +70° C

Table 29 shows the environmental specifications of the i2004 Internet Telephone.

Table 29
i2004 Internet Telephone—environmental specifications

Parameter	Specifications
Operating temperature	+5° to +40° C, ambient
Operating humidity	+5% to 95% RH (29 g/m3 mean absolute humidity)
Storage temperature	−40° to +70° C

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Meridian 1 and Succession Communication
Server for Enterprise 1000

Internet Terminals

Description

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